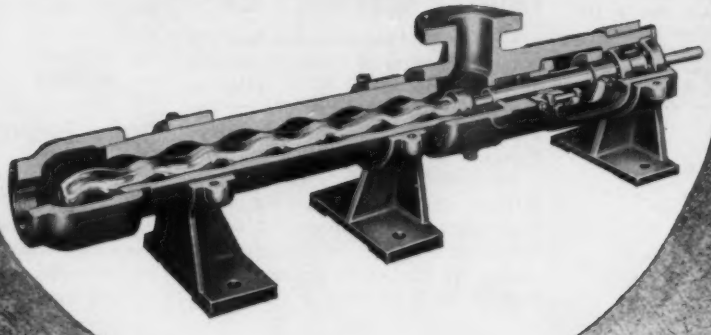
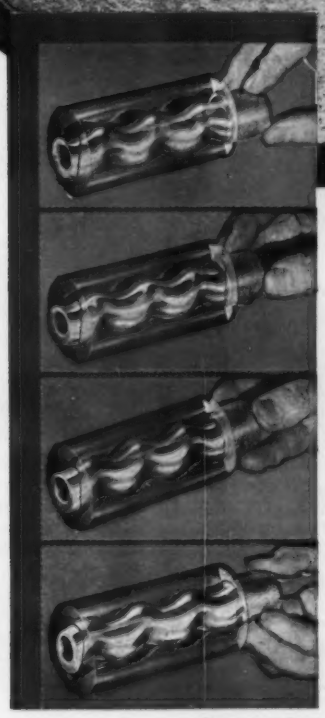
IF IT CAN BE PUSHED THROUGH A PIPE... A MOYNO® WILL PUMP IT!





■

Moyno's exclusive "progressing cavity" principle permits hundreds of formerly "unpumpable" materials to be handled successfully. The screw-like rotor revolves in a double threaded stator forming "progressing cavities" that move the material smoothly without foaming, aerating, crushing or excessive pump wear.

Typical materials pumped include non-pourable pastes, slurries, chemicals, foods, acids, even suspended solids up to one inch in size. Capacities available up to 500 gpm and pressures up to 1000 psi.

No doubt a Moyno Pump can cut costs drastically for you. *Write for Bulletin 30-PE.*

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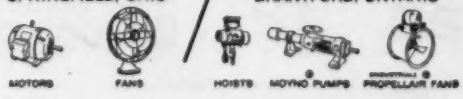

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'ROUND ABOUT

with the editors in field and office

Edited by R. L. Marinello

BRI Workshop Sessions

TECHNICAL WORKSHOPS on a wide variety of subjects will make up the program for the Building Research Institute's 8th Annual Meeting, to be held this year at the Penn-Sheraton Hotel, Pittsburgh, April 7 and 8.

Two half-day sessions will be devoted to a workshop on windows, in which design, selection, operation and maintenance of windows will be analyzed in terms of the problems encountered by building owners and maintenance men.

Engineering Appointment at RCA

Charles H. Eisengrein has been appointed manager of plant engineering at the Moorestown, N. J., plant of the Missile and Surface Radar Department, RCA Defense Electronic Products.

He joined RCA in 1951. He was manager of plant engineering at the RCA plant in Canonsburg, Pa., before being transferred to Moorestown. He earned his bachelor's degree in civil engineering from New York University and his master's degree in industrial engineering from Columbia University.

Plant Engineer Promoted

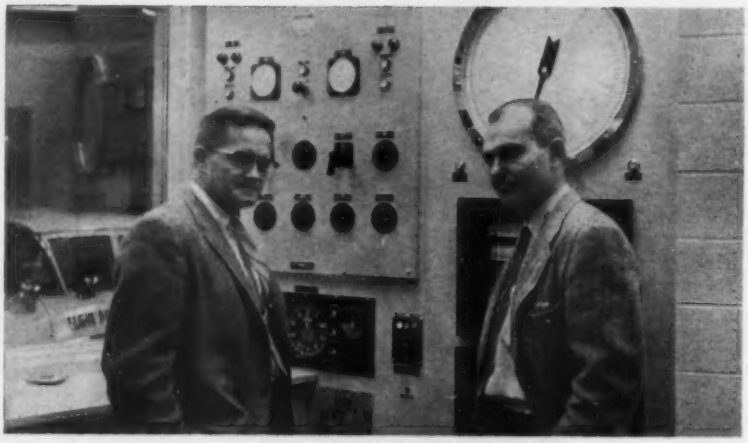
Roger D. Williams has been named plant manager and assistant to the general manager of Carling's Natick Brewery.

He joined the company in 1953 and has been plant engineer of the Natick operation since 1955. A native of Rockland, Mass., and a direct descendent of the founder of Rhode Island, he holds two degrees from Brown University. Prior to his employment with Carling, he worked for the Procter and Gamble Company for six years.

Design Engineering Conference

MORE EFFECTIVE use of engineers will highlight the topics to be discussed at the fourth Design Engineering Conference. The conference, held concurrently with the Design Engineering Show, is scheduled for Con-

Indoor "Test Track" Shown to Editors on Laboratory Tour

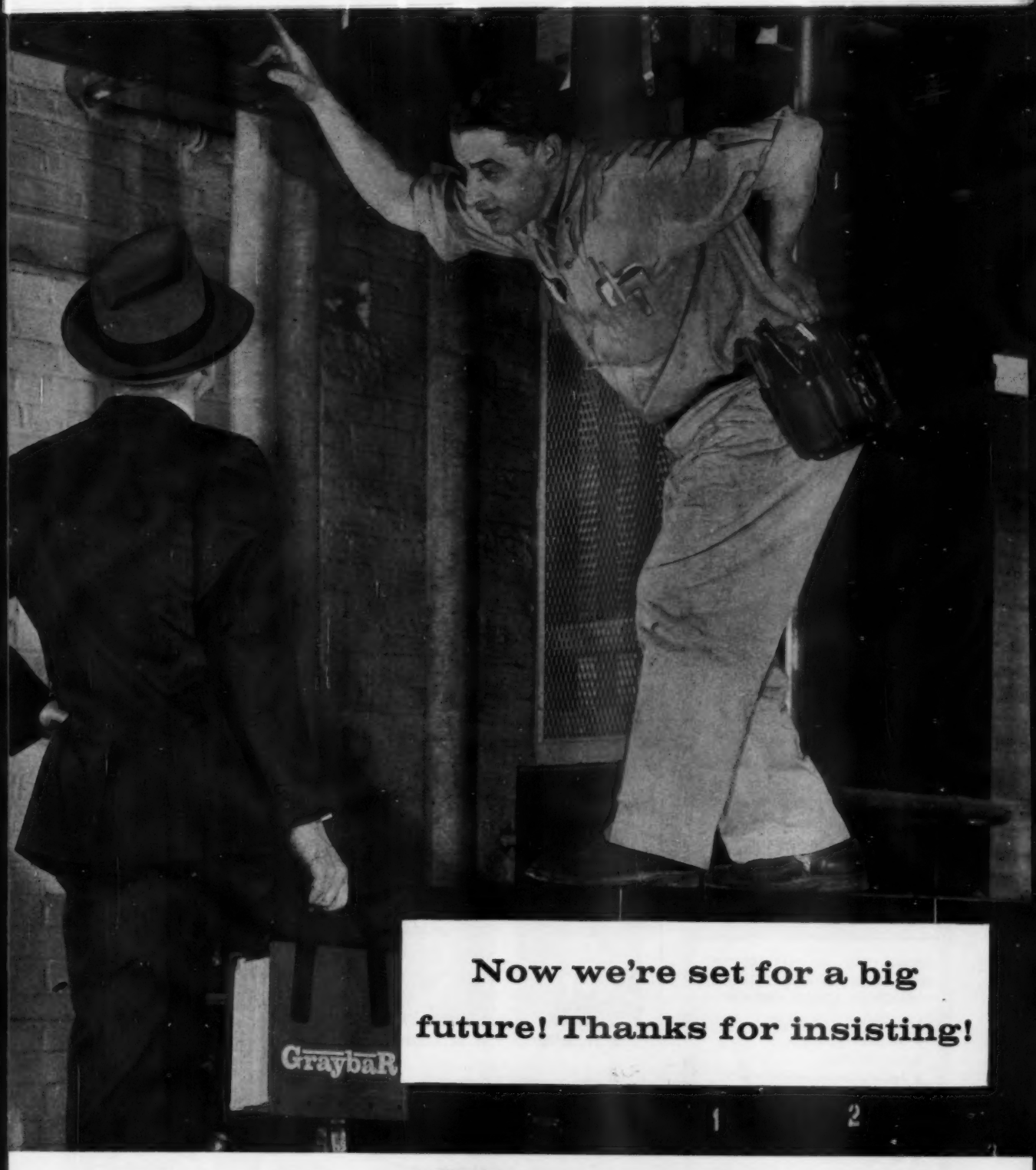


With portions of the control panel and the observation window in the background, Don Wangelin, right, plant engineer at Pure Oil's Research Lab in Crystal Lake, Illinois, describes the operations of the lab's new dynamometer room. Plant Engineering editors Andy Anderson, left, and Vern Kempf (behind) the camera) recently toured the entire facilities of the research laboratory.

Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by the 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Chicago, Ill.

'ROUND ABOUT

Pittsburgh. This new responsibility will



Include the Graybar man in your electrical planning.

The recommendation he makes comes from experience with countless kinds of *power distribution equipment,* motors, controls, wiring and lighting supplies.

Call Graybar for *impartial recommendations* . . . and able, *in-the-plant help.* We'll work with you or your electrical contractor. 95

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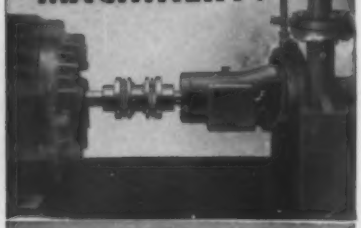

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NO MAINTENANCE
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Future maintenance costs and shutdowns are eliminated when you install Thomas Flexible Couplings. These all-metal couplings are open for inspection while running.
They will protect your equipment and extend the life of your machines.
Properly installed and operated within rated conditions, Thomas Flexible Couplings should last a lifetime.

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES:

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- No Maintenance

Write for Engineering Catalog

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

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'ROUND ABOUT

vention Hall, Philadelphia, from May 25 to 28.

There will be two conference sessions dealing with the more efficient use of engineering talents and skills. The first will consider the philosophy of engineering design in foreign countries. The second will discuss the efficient organization of a design department.

On the second and third days of the conference, there will be three concurrent sessions dealing with choice of materials in design, mechanical aspects of design and power and control.

Information about the conference, advance registration tickets for the show, and hotel information may be obtained by writing to Clapp & Poliak, Inc., 341 Madison Ave., New York 17, New York.

New Appointments at Dravo

Robert W. Hiller has been appointed assistant to the general manager of the Engineering Works Division of Dravo Corporation, Pittsburgh. He has been plant engineer for the division since 1946.

In his new position, he will supervise the coordination of planning, scheduling and measurement of progress for the Division.

A native of Pittsburgh, Mr. Hiller joined Dravo in 1940. He was previously associated with Blaw-Knox Company and Struthers Wells Company as an engineer. He attended Carnegie Tech and received his mechanical engineering degree in 1937.

R. W. Hiller

W. L. Threadgill

Mr. Hiller is a member of the Engineers Society of Western Pennsylvania and is a past president of both the Plant Engineers Association of Pittsburgh and the international organization, The American Institute of Plant Engineers. He is presently serving on the executive committee of the American Institute of Plant Engineers.

Walter L. Threadgill has been appointed to take over Mr. Hiller's duties as plant engineer of the Engineering Works Division of Dravo Corporation, Pittsburgh. This new responsibility will be in addition to his present assignment as methods engineer for the Engineering Works Division.

A native of Texas, Mr. Threadgill received a degree in mechanical engineering from Massachusetts Institute of Technology in 1941. He first joined Dravo in 1941 as an engineer in the Keystone Division. In 1946, he took a position as plantation engineer for the Hawaiian Pineapple Company and in 1954 rejoined Dravo.

Annual on Engineering Meetings

WHICH CONVENTIONS and technical meetings should engineers from your company be attending? Which meetings are being held within easy reach of your company's location? Answers to such questions will be found in the recently published annual, identified by the title Engineering and Technical Conventions.

This publication lists the national, regional and state technical meetings and conventions of more than a hundred engineering and scientific societies and related organizations. Each entry includes the dates, location, headquarters, title of the meeting and the sponsoring organization. An index makes it easy to locate meetings by technical subject, by location and by the sponsoring organization of a particular meeting.

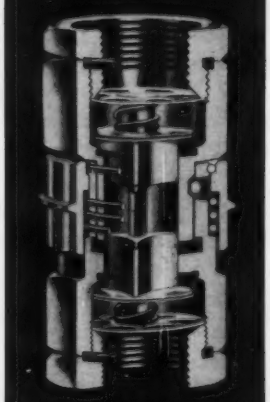
The booklet Engineering and Technical Conventions is available from Industrial Relations News, 230 W. 41st St., New York 36, N. Y., at $4.00 per copy.

Basic Principles of Industrial Materials Handling

INFORMATION IN this revised materials handling booklet tells what materials handling is, what the costs are, what the objectives are and how proper materials handling equipment is selected.

The title of the booklet is "The Basic Concepts of Industrial Material Handling." It is a revised, up-to-date successor to the original booklet that was published in 1952. The booklet has been rewritten to reflect and keep pace with the fast-growing techniques of the industrial materials handling industry.

Single copies of this booklet are available without cost. If you would like a copy of Booklet Number One send your request to The Material Handling Institute, Inc., Educational Division, One Gateway Center, Pittsburgh 22, Pa. A nominal charge is made for quantity copies of this and other material handling booklets.



Provided with valves to give two-way or one-way automatic line shut off.

Built to handle high pressure hydraulic and pneumatic systems

Snap-Tite *valved* couplings stop flow instantly"

Snap-Tite provides instant shut-off wherever fluid coupling is needed.

Snap-Tite *valved* couplings connect and disconnect quickly and fully—they automatically open line flow when connected; positively seal your line when disconnected—with no "ifs," no chance for human error.

Snap-Tite couplings are available in sizes from ¼" to 6" ID, in steel, brass, aluminum, 303 ss and 316 ss. Sizes from 6" to 10" ID are available on special order. For more information, write for Snap-Tite catalog #58. Snap-Tite representatives are located in all principal cities.

SNAP-TITE COUPLINGS CAN HANDLE ALMOST ANYTHING THAT FLOWS

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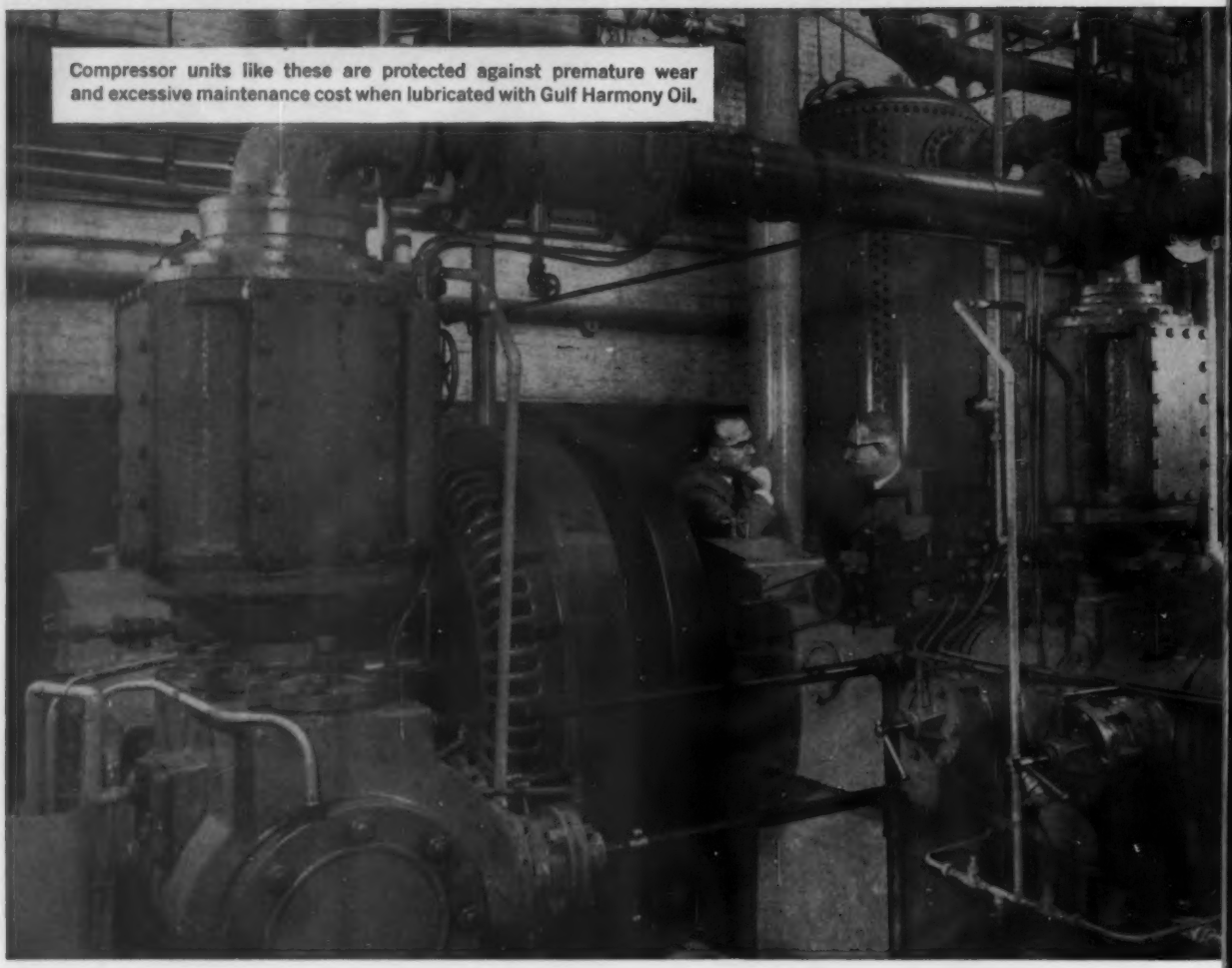


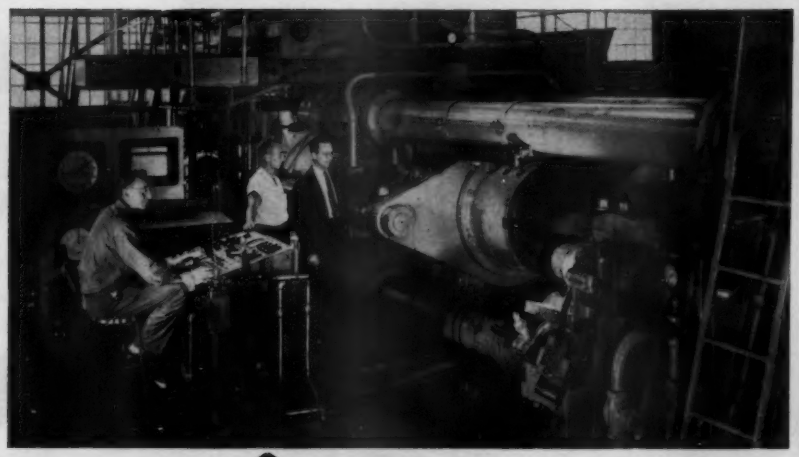
Compressor units like these are protected against premature wear and excessive maintenance cost when lubricated with Gulf Harmony Oil.

Gulf makes things run better with outstanding multi-purpose

NEW AND IMPROVED

Gulf Harmony, a long-time favorite multi-purpose oil, is now further improved to serve you even better. Here are a few of the improved Harmony's many advantages:

- Higher oxidation resistance assures longer life and freedom from harmful sludge deposits.
- Retains its original viscosity over longer periods of time.
- Maintains its color stability longer.
- Anti-corrosion additive protects against rust.
- Patented anti-foam agent prevents objectionable foaming.
- Performs exceptionally well in bearings exposed to high ambient temperatures and humid atmospheres.



New and improved Gulf Harmony Oil is setting new standards of performance in heavy equipment like this 3000-ton extrusion press.

Hydraulic stamping presses require an oil that has high resistance to oxidation, good rust preventive qualities and anti-foam properties. Gulf Harmony Oil is ideal for this type of service.

industrial lubricating oil . . .

GULF HARMONY

Gulf Harmony is available in the proper grades to meet your every need. It is ideal for hydraulic systems, air compressors, blowers, dryer-roll bearings, machine tools, electric motors, central circulating systems, and a host of other applications.

Your Gulf Sales engineer will gladly show you how new Gulf Harmony can help cut your maintenance costs and simplify your lubricant storage and handling. See how Gulf makes things run better in your operation. Just call your nearest Gulf office, or write for illustrated bulletin.

GULF OIL CORPORATION
Dept. DM, Gulf Building
Pittsburgh 30, Pa.

GULF

Yes! Without obligation on my part, send me illustrated bulletin on new Gulf Harmony.

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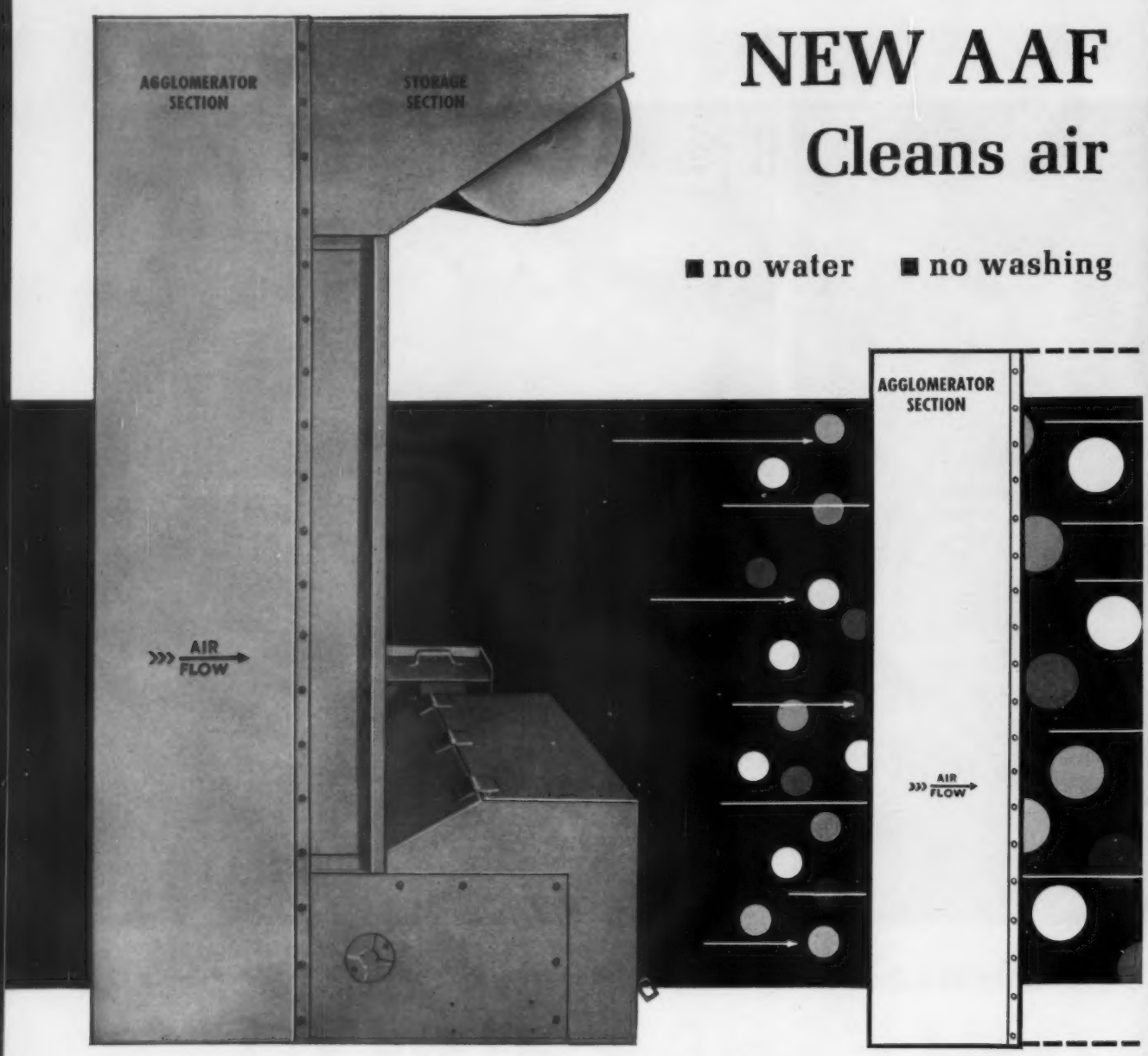
NEW AAF
Cleans air

■ no water ■ no washing



Here is the only air filtration unit in the world that offers

- **the efficiency of an electrostatic precipitator, and**
- **the minimum maintenance of an automatic-renewing, disposable media air filter,**

both in one space-saving unit!

This revolutionary new air cleaner is the Rollotron. Its unique operating principle is shown in the exploded "flow diagram" illustration.

In overall size, the Rollotron requires no more space than any other electrostatic precipitator. Regardless of unit height or width, depth is only 39"!

1 TRAP THE DUST ELECTRONICALLY!

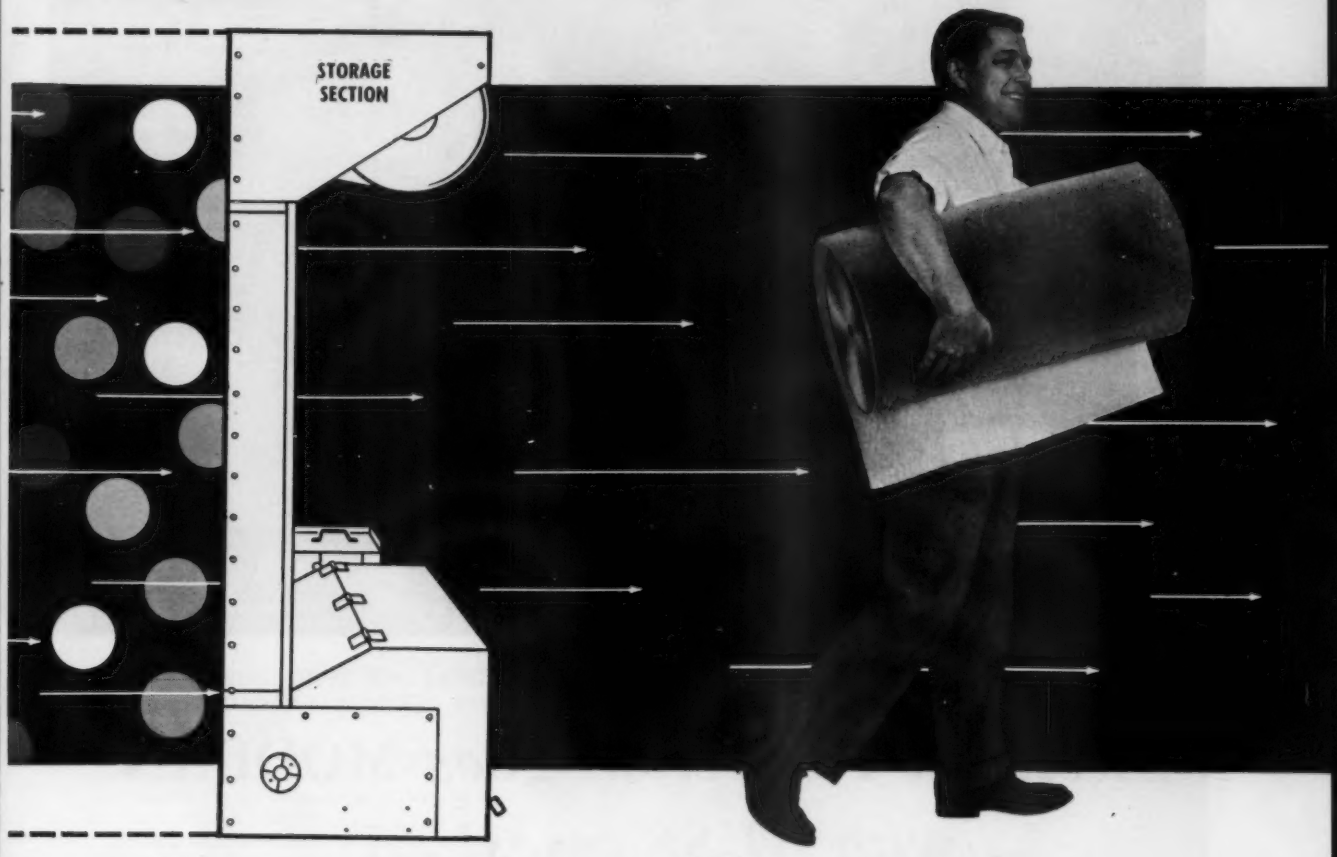
Minute dust particles are electrostatically attracted and adhere to each other on the *dry* plates of the agglomerator section. As the trapped dust particles build up (agglomerate) on the collector plates, the "mass" increases until the accumulation is swept off the plates by the air stream. Dirt is then carried onto the bonded glass fiber media of the storage section.

Maintenance on precipitator section? Virtually none. No oiling, no washing, no water, no freezing, no drains.

ROLLOTRON

electronically, rolls away the dirt!

■ no freezing problems ■ no drains ■ no oiling of plates



2 ROLL IT UP AUTOMATICALLY!

A bonded glass fiber "blanket" is fed automatically down the face of the storage section from a roll at the top. The used media—and accumulated dirt—are wound tightly into a compact roll at the bottom.

Maintenance? Simply replace the soiled roll with a clean one—an operation as simple as changing the film in your camera! In normal service, this is required only about once a year! The Rollotron makes scheduled maintenance a thing of the past!

3 TAKE IT AWAY PERIODICALLY!

With quick, easy media replacement, the Rollotron is again ready to give maximum air cleaning—*electrostatic* air cleaning—for months to come!

For complete information on "electronically clean air by the roll" see your local AAF representative or write for Rollotron Bulletin 249. Address: Mr. Robert Moore, American Air Filter Company, Inc., 228 Central Avenue, Louisville, Kentucky.

AAF **American Air Filter**

BETTER AIR IS OUR BUSINESS

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Architect: GRAHAM, ANDERSON, PROBST & WHITE, Chicago, Illinois
Electrical Contractor: HYRE ELECTRIC CO., Chicago, Illinois

Electrical Protection goes MODERN *with BUSS fuses! . . . in the MORTON SALT BUILDING Chicago, Ill.*

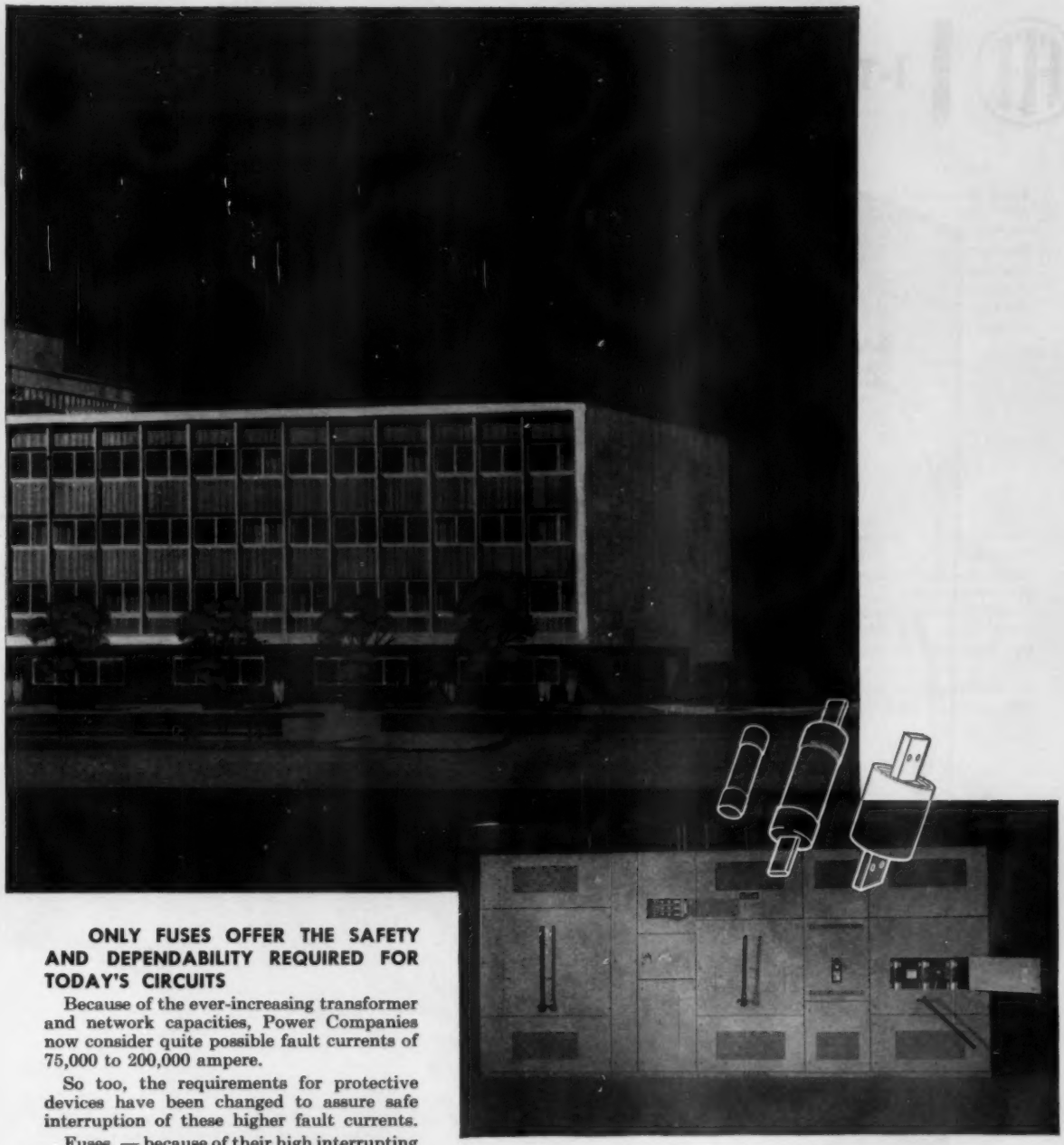
The beautiful, new Morton Salt Building is located at 110 North Wacker Drive in Chicago — just outside the Loop.

The safest and most dependable electrical protection was needed because the engineers estimated the available fault current might easily reach a value of 75,000 amperes.

For this reason, the main switchgear, consisting of 1-4000 ampere, 1-2000 ampere and 1-1200 ampere pressure switch, is completely equipped with BUSS Hi-Cap fuses.

To make available the same safe, dependable and trouble-free protection, all distribution panels are equipped with FUSETRON dual-element fuses.

THERE IS A BUSS OR FUSETRON FUSE FOR EVERY ELECTRICAL NEED



ONLY FUSES OFFER THE SAFETY AND DEPENDABILITY REQUIRED FOR TODAY'S CIRCUITS

Because of the ever-increasing transformer and network capacities, Power Companies now consider quite possible fault currents of 75,000 to 200,000 ampere.

So too, the requirements for protective devices have been changed to assure safe interruption of these higher fault currents.

Fuses, — because of their high interrupting capacity and dependability — prove superior in meeting modern protection requirements.

With Fuses, Safe Protection Remains Safe

Dust, fumes, corrosion or age cannot increase a fuse's capacity or lengthen its blowing time. The operation of a fuse is not dependent on latches, triggers or other devices that are subject to the strains and jars of mechanical action — both in opening and closing.

A fuse cannot stick or fail to operate when electrical trouble occurs. 1 year, 5 years or 20 years from now, a fuse will provide the same, high degree of protection as on the day it was installed.

Morton Salt Building: Mains and Feeders protected by BUSS Hi-Cap and FUSETRON Fuses

On installations of 0 to 600 amperes . . .

By Installing FUSETRON dual-element FUSES—YOU GET 10 POINT PROTECTION

With rare exceptions, other types of protective devices protect only against short-circuits —

BUT, FUSETRON dual-element fuses give you safe, trouble-free 10 point protection.

For the FUSETRON fuse story ask for Bulletin FIS.

For Loads above 600 amperes . . .

BUSS Hi-Cap Fuses offer Safest, Most Modern Protection

They have an interrupting capacity sufficient to handle any fault current regardless of system growth — and by coordinating them with FUSETRON fuses on feeder and branch circuits, outages caused by fault currents can be limited to circuit of origin.

For the BUSS Hi-Cap fuse story ask for Bulletin HCS.

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BUSSMANN MFG. DIV. McGRAW-EDISON CO. ST. LOUIS 7, MO.

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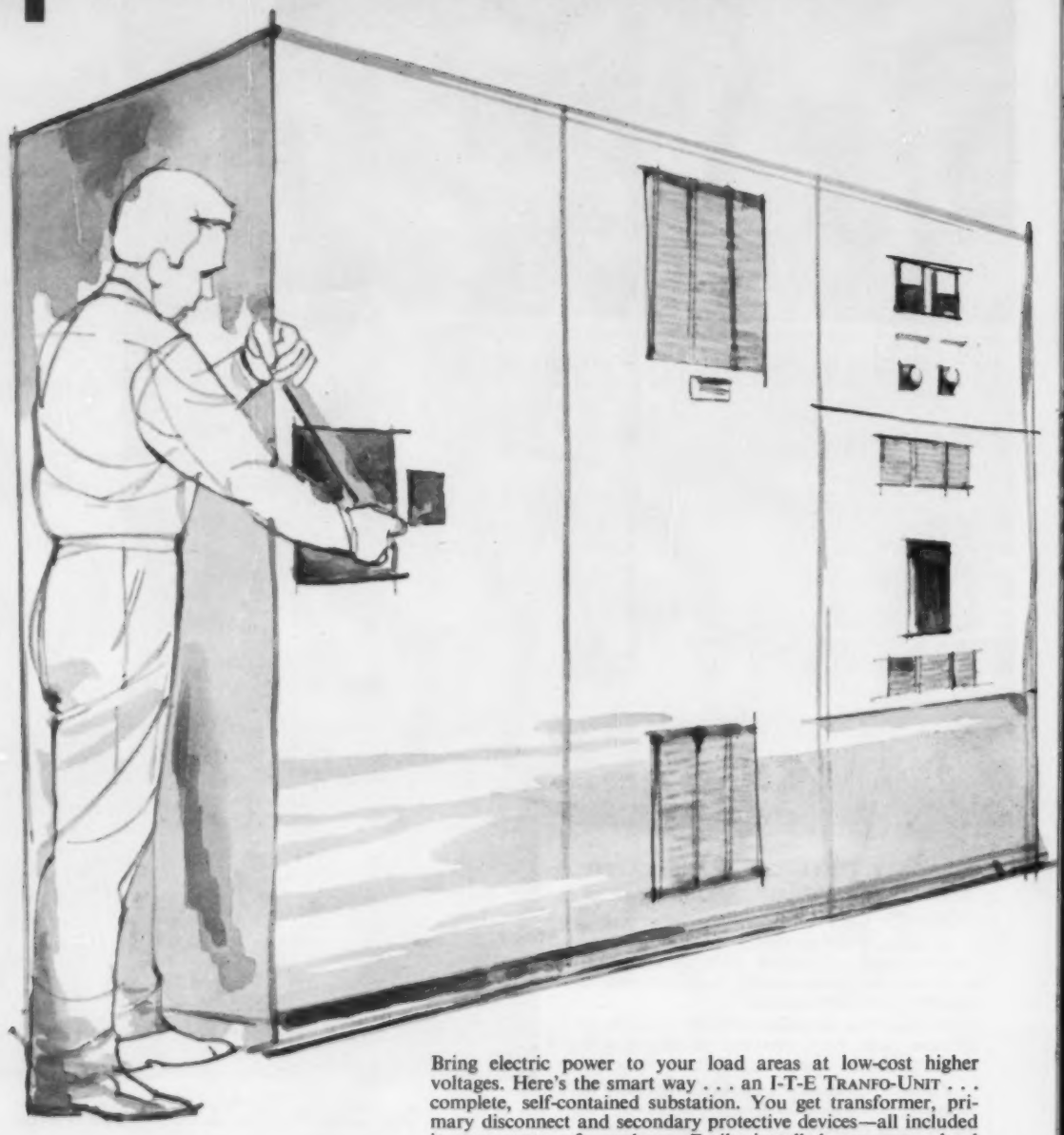
I-T-E CIRCUIT BREAKER COMPANY

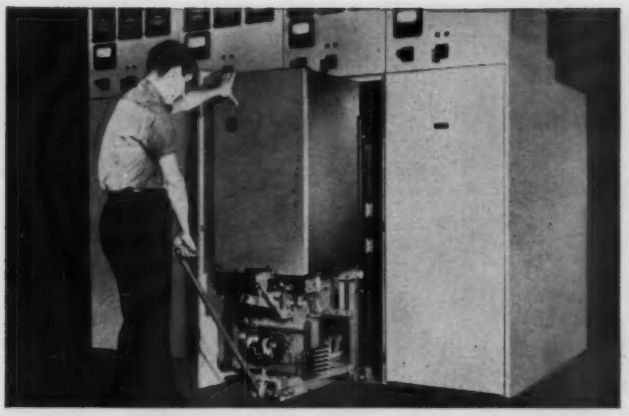


SMART

Bring electric power to your load areas at low-cost higher voltages. Here's the smart way . . . an I-T-E TRANFO-UNIT . . . complete, self-contained substation. You get transformer, primary disconnect and secondary protective devices—all included in one neat, safe package. Easily installed near your load centers. Improves motor performance and lighting efficiency . . . slashes line losses.

An I-T-E TRANFO-UNIT costs no more than hodgepodge arrangements of assorted gear. But it looks so much better. It's safer. And it makes possible significant economies. For example, it's delivered in one piece . . . saving installation expense. Wide choice of components means complete design flexibility. So you can meet your own requirements exactly. Available in the industry's widest range of kva ratings.

Applications for which an I-T-E TRANFO-UNIT is particularly suited include: small industrial loads, warehouses, hospitals, schools, office and commercial buildings. When you install electrical equipment for such uses, benefit from the advantages of the I-T-E TRANFO-UNIT. They are typical of the advantages you get in all I-T-E equipment. Yet when you buy I-T-E, you pay no more. Why buy anything else?



Metal-clad switchgear you can be proud of. Extra sturdiness for longer life. Extra craftsmanship for finer appearance. Extra safety for greater personnel protection. All components completely accessible. Even rear doors are hinged. Advanced design, uniform-flux-density coils mean extra protection against heavy current faults.

600 volt value package. New URELITE® individually enclosed I-T-E K-line circuit breaker—world's most advanced. Main disconnect contacts visible through side window for extra safety. Pull-down handle action provides quick manual make for safety and long contact life. New wide-range overcurrent trip device lets you increase breaker setting when your load increases. No parts to replace.

Saves 50% switchboard space. I-T-E CORDON® circuit breaker provides up to 100,000 amp interrupting capacity with molded case construction. Costs approximately ⅓ less than alternative devices. Available in sizes for many applications, loose or individually enclosed.

I-T-E Circuit Breaker Company
1900 Hamilton St., Phila. 30, Pa.

- ☐ Low voltage switchgear
- ☐ Metal-clad switchgear (5 and 15 kv)
- ☐ Secondary unit substations
- ☐ Outdoor substation structures
- ☐ TRANFO-UNITS
- ☐ URELITE circuit breakers
- ☐ Small air circuit breakers
- ☐ CORDON circuit breakers
- ☐ Power switching centers

Name.....Title.....

Company.....

Street.....

City.....Zone.....State.....

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Get full details on specific I-T-E equipment. I-T-E engineering assistance is at your disposal.

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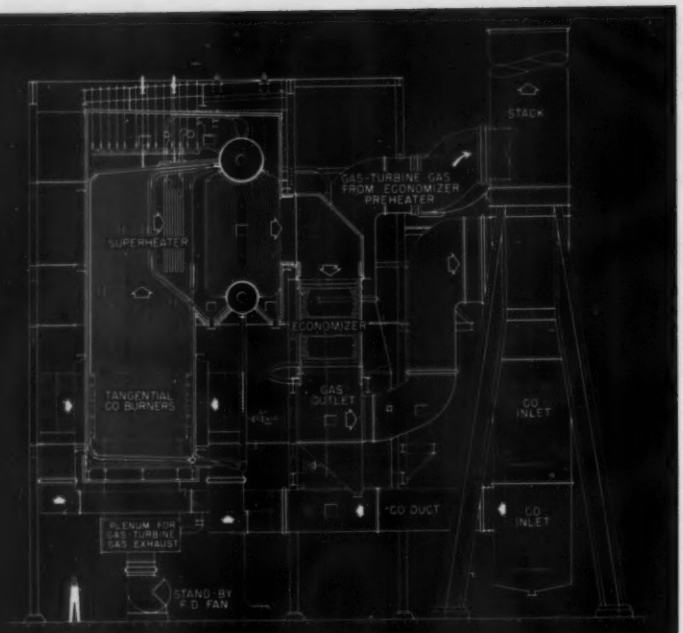
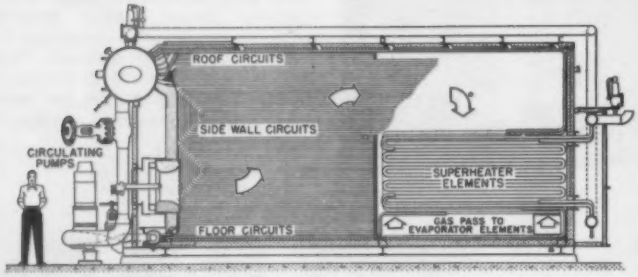


For refineries

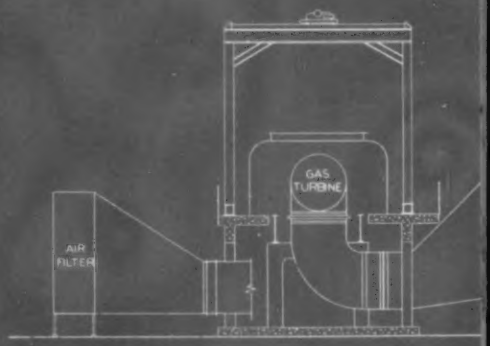
C-E Vertical Unit Boiler, Type VU-40 CO — tangentially fired boilers to efficiently utilize energy potential in hard-to-burn waste catalyst regenerator gas. Illustrated is an installation at a Gulf Coast refinery. It combines a catalyst regenerator, two gas turbine-driven compressors, two CO boilers, and separate turbine-exhaust-gas feedwater heaters located between the boilers. Available in a wide range of sizes for any quantity of catalyst regenerator gas and for any steam capacity, CO Boilers by C-E have been in service more than three years.

Special boilers for special



For diverse industrials

C-E Package Boiler, Type PCC—new, completely shop-assembled, high performance, Controlled Circulation steam generator. Now in service with capacities to 120,000 lb/hr, it is available with temperatures to 900 F. and pressures to 1,000 psi (or higher if desired). This boiler is especially suitable where maximum capacity, temperature, and pressure are required, yet space is limited. Offers easy handling of rapid load swings and high quality steam production. PCC's in service include the world's highest capacity, highest pressure, and highest temperature package boilers.



C-E builds boilers of virtually all designs and types known in present practice . . . in capacities from less than 10,000 to 4,000,000 or more lb. of steam per hr. It is presently building units that will set new world records for capacity, pressure and temperature.

This vast experience has also been successfully applied to the development of many special designs to utilize waste fuels or to meet unusual steam requirements or space conditions.

A few recent examples of special C-E designs which have successfully met unusual problems are illustrated here. In several cases, this success may be attributed to the utilization of exclusive C-E developments such as controlled circulation or tangential firing.

Whether your requirements call for boilers of unusual characteristics, such as those shown here, or for more conventional standard designs, come to C-E where you'll find the skill, experience, facilities—and desire—to meet your needs *exactly*.

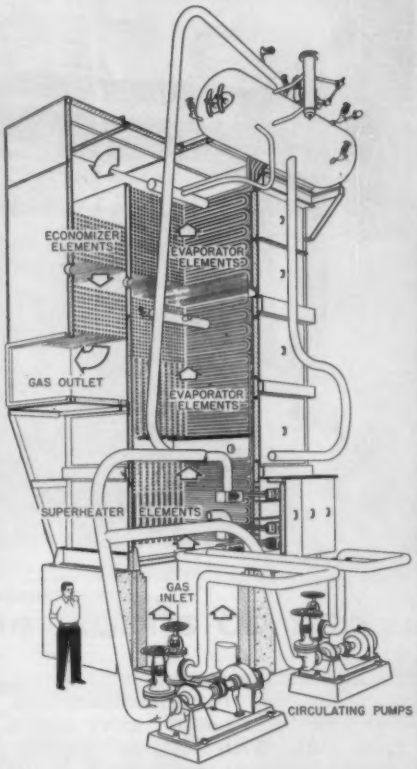
needs – by C-E

For gas turbine installations

C-E Gas Turbine Boiler—waste heat design for economical utilization of gas turbine exhaust sensible heat. Usable in a choice of cycles to obtain fired or unfired heat recovery and steam generation. Illustrated is a combined cycle, two of which are in service at a chemical plant. Here the turbine is followed by a waste heat boiler, multiple-purpose economizers (process and feedwater), and a conventional oil-fired steam generator which uses a portion of the high temperature exhaust gas for combustion air.

For the steel and chemical industries

C-E Package Boiler, Type WCC—a Controlled Circulation design which utilizes waste heat from open hearths or chemical processes. The platen surfaces featured in the first pass permit passage of abrasive or "sticky" gas without erosion or bridging, prolonging boiler life and making the unit easier to clean. Controlled Circulation assures positive control of water to all circuits, permitting a smaller boiler with obvious space-saving advantages. Seven WCC's are now in service; eight others are being erected.



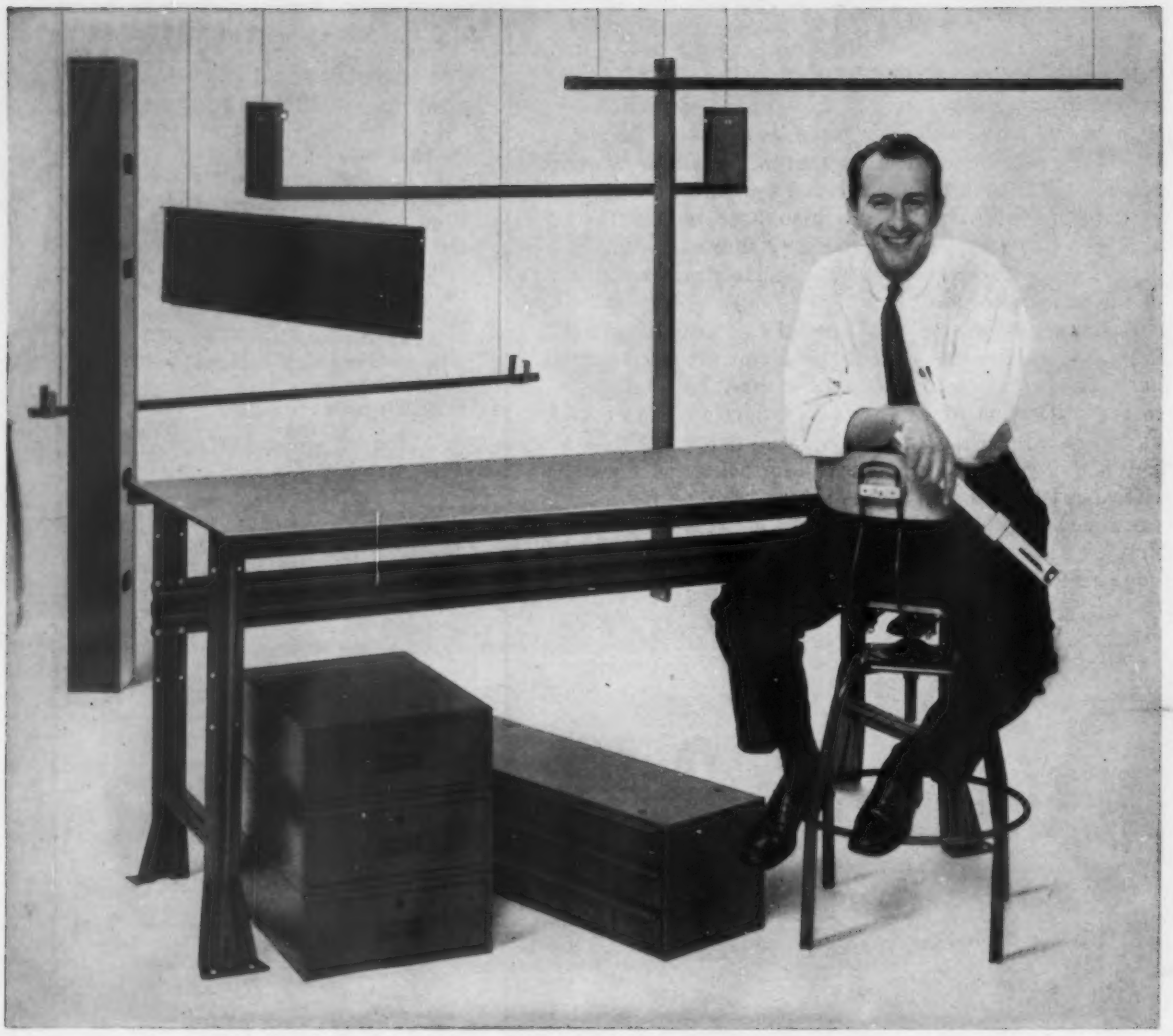
COMBUSTION ENGINEERING

Combustion Engineering Building, 200 Madison Avenue, New York 16, N. Y.

C-195

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

For more facts circle 510 on Reply Card



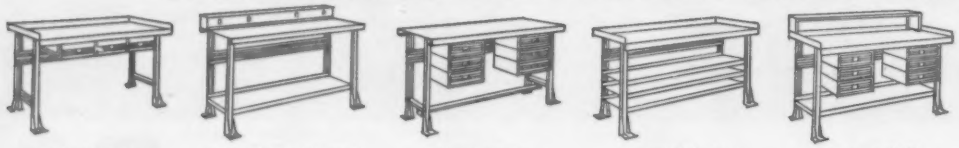
You can do almost anything with a Hallowell bench

Custom-built benches for assembly areas, soldering, inspection, tool rooms, laboratories, model shops and other uses needn't carry special equipment price tags. With Hallowell standard work bench variations, you can install a full range of special equipment, at standard bench prices.

Make changes as you need them. Add accessories, drawers, cabinets, electrical equipment easily and quickly to meet changing requirements. Re-equipment costs are kept to a minimum because you buy only the additional parts and accessories you need.

Make a sound investment. Hallowell Steel Equipment doesn't become obsolete. It has almost unlimited adaptability to new and different uses. And its ruggedness is your assurance of long-lasting value.

CUSTOM-TAILOR HALLOWELL OPEN BENCHES TO YOUR SPECIFIC NEEDS



Add drawers . . . | or an electrical panel . . . | drawer tiers . . . | lower shelves . . . | or a top shelf . . .

. . . or combinations of these and many other accessories available from stock.

There's an authorized Hallowell distributor near you who will be glad to show you the complete Hallowell line. Get in touch with him, or write Columbia-Hallowell Division, SPS, Jenkintown 26, Pa. or SPS Western, Santa Ana, Calif.

SPS

Jenkintown • Pennsylvania

Standard Pressed Steel Co. • The Cleveland Cap Screw Co. • Columbia Steel Equipment Co. • National Machine Products Co. • Nutt-Shel Co. • SPS Western • Standco Canada, Ltd. • Unbrako Socket Screw Co., Ltd.

For more facts circle 511 on Reply Card

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IT'S A MATTER OF

pulling together!

GOODYEAR

And here's how Green Seal V-Belts by Goodyear make pulling together pay—and pay—

On every type of drive—in every part of America—Green Seal by Goodyear are and outlast anything

—AT AN OHIO CHEMICAL PLANT

Operation: Pulverizing nickel formate

Drive: Main drive on micro-atomizer — handles 20 h.p. at 5,868 f.p.m.

Service: *Eight matched V-Belts with the Green Seal served for more than 6 months compared with 4-week life for 10 belts of another make.*

—IN A MISSOURI PIPE PLANT

Operation: Making fire clay and sewer pipes

Drive: 125 h.p. ball-mill drive

Service: *Fourteen matched V-Belts with Green Seal construction served 6 years without maintenance of any kind.*

every kind of industry—in matched V-belts with the pulling together to outperform else belt-users can buy—

—ON A TEXAS OIL RIG

Operation: Drilling oil wells

Drive: Main drive on mud pump

Service: *20 V-Belts with the Green Seal pulled together to drill 202,790 feet of hole—more than 25% better than the average belt-life in this service.*

—AT A SOUTH CAROLINA FABRIC MILL

Operation: "Soaping" screen-printed fabrics

Drive: 50 h.p. "soaping" range drive with belt speed of 1,413 f.p.m.

Service: *Ten matched V-Belts with Green Seal construction served 8 years with virtually no time out.*

Here's why

V-BELTS

with the

Green ✿ Seal

always pull together

The secret's their unequalled dimensional stability. And it's built into each belt via special tension members of steel cable or exclusive, synthetic Triple-Tempered (3-T) Cord. Then every set is precision-measured—several times over—to make sure they are perfect teammates.

That means matched sets really match. Every belt does its part of the job. There are no "loafers" to put extra strain on the other belts. No belt ever overworks and causes a premature failure. It's strictly a matter of *pulling together* – whether your drive calls for two or fifty belts.

What's more, every V-Belt with the Green Seal is designed to outperform all others. High in modulus, they're low in stretch to minimize take-up. They're friction-balanced – so covers don't stick or grab in the grooves. They're non-dusting, too.

In short, these are the belts that give you maximum, trouble-free hours at minimum cost. You need belts like these to pull together on your drives—large and small.

Just contact your Goodyear Distributor—or fill out the handy coupon below.

Green Seal—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

DIMENSIONALLY STABLE V-BELTS WITH THE GREEN SEAL BY

GOODYEAR

THE GREATEST NAME IN RUBBER

S-51162

THE GOODYEAR TIRE & RUBBER COMPANY, Industrial Products Division, Dept. 794, Akron 16, Ohio

Please send me more information about how V-Belts with the Green Seal solve the major problem in belting multiple V-Belt drives.

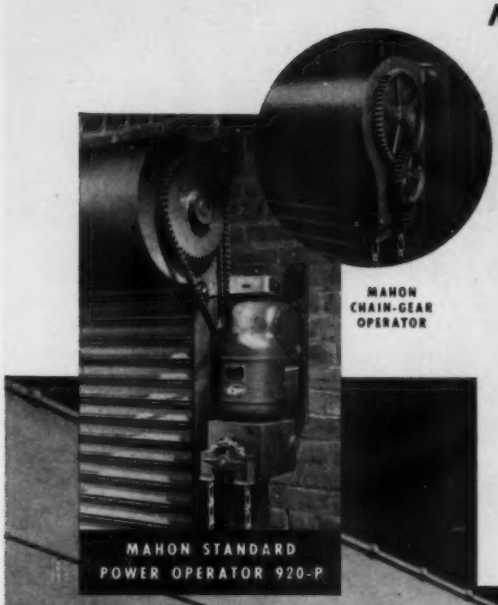
Name .....

Company .....

Street Address ..... City ..... Zone ..... State .....

Rolling Steel Doors

Manually, Mechanically, or Electrically Operated



Whether it be a truck opening, shipping dock opening, railroad opening or crane opening, in new construction or in an old building, rolling steel doors offer very definite timesaving and space saving advantages . . . the fast, vertical roll-up action of the door curtain requires no usable space either inside or outside of the opening—and there are no overhead tracks or other obstructions to restrict headroom and interfere with material handling or stacking adjacent to the opening. In addition, the all-metal construction of Mahon Rolling Steel Doors give you the permanence of Bonderite protected steel . . . maintenance is minimal, and, in steel, you also get maximum protection against intrusion and fire. No other type of door can provide all of these important features which are so necessary for functional efficiency in door openings today. When you select a rolling steel door, check specifications carefully . . . you'll find, through comparison, that Mahon Rolling Steel Doors are built better to give you better service over a longer period of time. See Sweet's Files for complete information, including specifications, or write for Mahon Catalogue G-59.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York and Chicago • Representatives in Principal Cities

Manufacturers of Rolling Steel Doors, Grilles, and Automatic Underwriters' Labeled Rolling Steel Fire Doors and Fire Shutters; Underwriters' Rated Metalclad Fire Walls, Insulated Metal Curtain Walls, Electrified M-Floors, Acoustical and Troffer Forms, Acoustical Metal Ceilings, Steel Roof Decks, and Long Span M-Decks.

ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

The illustration above shows four Mahon Power Operated Rolling Steel Doors, 18 Ft. x 14 Ft., installed in a new addition to the plant of Remke, Inc., Roseville, Michigan, Builders of Commercial Truck Bodies and Trailers.

MAHON

For more facts circle 513 on Reply Card

New Super Coilife gives rewound motors extra life

Moisture, acids, alkalis and other contaminants are locked out once and for all with Super Coilife epoxy encapsulation. For full motor protection, Super Coilife can be applied to random wound stators, rotors and armatures. Super Coilife's mirror-like finish will not crack or craze under severe operating conditions.

Because of its unusually low viscosity, this new solventless epoxy completely penetrates the interstices, through the slots, thoroughly coating and protecting the windings. Since 1953, when Westinghouse introduced Coilife* epoxy encapsulation, research, engineering and development have evolved this new and improved product—Super Coilife, an exclusive process.

Only Westinghouse Repair Plants can give the right "thin-wall" thickness for each type and class of winding to give maximum heat transfer away from the windings. Before you send out your next rewind call your Westinghouse representative for the complete story or write for Booklet B-7622: Westinghouse Electric Corporation, P. O. Box 868, 3 Gateway Center, Pittsburgh 30, Pa.

*Trade-Mark

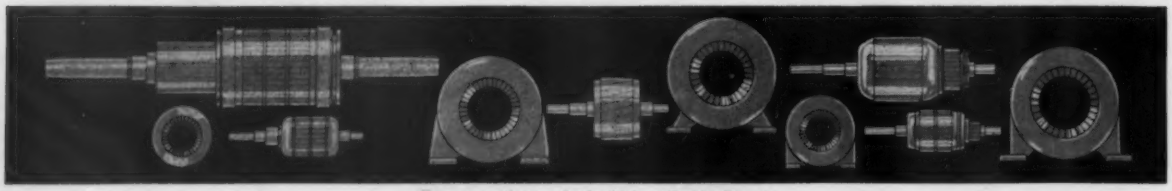
J-95197-A

YOU CAN BE SURE...IF IT'S

Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

USE WESTINGHOUSE MODERN MAINTENANCE SERVICE... SHOP REPAIRS... RENEWAL PARTS... FIELD SERVICE



For more facts circle 514 on Reply Card

BULLETINS just released and of immediate plant interest

VALVES, PIPING, FITTINGS

101 Oil, Water, Air Valves—Twenty-pp Catalog 59-60 is divided into three sections according to type of medium—oil, water or air—and features manual, foot-operated, and solenoid valves, with overall pressure range from vacuum to 10,000 psi. Typical flow patterns and illustrations of specific valves, port sizes, ordering data and valve numbers are shown. Catalog includes section on how to locate company representative. Barksdale Valves.

102 General Service Valves—Twenty-pp Bulletin E-165 is a guide to valves for general services. Types, typical applications, construction and operating features are discussed. Generously illustrated with drawings, photos and cutaways, booklet includes sizes. Everlasting Valve Co.

103 Bonnetless Gate Valve—Sixteen-pp Catalog 300 introduces a forged steel gate valve, up to 2 in., designed to prevent leakage, provide tight shut-off and permit fast servicing in the line. Design advantages are discussed and illustrated. Cutaways show ease of removal and replacement of wedge and stem and of seats. Bulletin includes engineering data, also comparison of this valve with other models. Velan Valve Corp.

104 Surge Relief Valve—Bulletin W-2-A, 8 pp, tells how company's surge relief valve protects water lines against overpressure in the system. With this valve, the line pressure itself supplies the power to operate the valve automatically. Engineering information, detailed drawing and suggested specifications are provided. Golden Anderson Valve Specialty Co.

105 Control Valves—Illustrated Bulletin 581 describes Slim Line control valves, only 1-in. thick by 3 in. wide, which mount on any machine and can be manifolded into compact control centers. Presents solenoid, hand lever and ball actuated types. Hunt Valve Co.

106 Welded Steel Pipe—Welded steel pipe for industrial uses is featured in 40-pp Catalog 8558. Describes applications, advatages, standard specifications, production limits, linings, coatings, fittings, joints, and gives other essential information. Also included are data tables, drawings, and illustrations of typical installations. Armco Drainage & Metal Products, Inc.

107 Rigid Plastic Pipe—Six-pp Bulletin HT-100 describes a rigid plastic pipe designed for high temperatures, pressures. Specifications and advantages are detailed. Pictures of typical applications, installation information, tables and charts of working pressures, support spacing recommendations, physical properties, and resistance to common corrosives included. Carlon Products Corp.

108 Self-Cleaning Strainers—Automatic and twin basket self-cleaning strainers are described and illustrated in Catalog 500, about 17 pp. These strainers are for removal and continuous disposal of fine suspended particles from raw or process water, other liquids. Includes capacity data, list of installations. S. P. Kinney Engineers, Inc.

109 Hose Fittings—Condensed Catalog 34, 8 pp, is generously illustrated and contains essential information on a variety of Le-Hi couplings and fittings for many types of industrial hose. Includes data on clamps, valves and manifolds, nipples, others. Hose Accessories Co.

PUMPS, COMPRESSORS

110 Rotary Pumps—Bulletin 1535 covers general-purpose, industrial, internal gear rotary pumps. Describes operation and construction, applications, and includes capacities, rpm tables, dimension table with diagrams. The Deming Co.

111 Utility Pumps—Featured in this 8-pp bulletin are company's utility pumps which incorporate the helical screw principle and have no vanes, turbines or impellers. Advantages and operation are detailed and tables of dimensions and capacities, and performance data are included. Continental Pump Co.

112 Compressor Advances—Five advances achieved by company to increase operating efficiency of reciprocating pipeline compressors are described in 14-pp Bulletin 168. Described low ratio compressor cylinders, poppet-type valves, use of electronic brain to calculate performance; development and use of analog computer to calculate header sizes for optimum flow, advances in control and automation. Clark Bros. Co.

MECHANICAL POWER TRANSMISSION

114 For Power Transmission—This bulletin presents manufacturer's line of power transmission equipment. Contains brief description of major features of speed reduction drives; screw conveyor drives; adjustable speed drives; motor bases; and conveyor and split pulleys. Size ranges are listed. The American Pulley Co.

115 Adjustable-Speed Drives—Catalog 11058 is a 16-pp compilation of technical data which includes a discussion of the basic methods for operating d-c motors form a-c power sources. Typical schematic diagrams are included as representative of the more popular systems in general use. Specifications, speed and torque ratings and other data are included. Servo-Tek Products Co.

116 Worm Gear Reducers—Complete horsepower and torque data for company's worm gear units built on 2½ up to 4-in. centers are given in full-page tables in Bulletin 5018. Dimensions are diagrammed and tabulated in detail, and materials and design of interchangeable components are described. De Laval Steam Turbine Co.

117 Precision Gears—This 32-pp booklet contains pictures, engineering drawings and data for everyday application of precision gears and allied components. A few of the subjects discussed are "tooth-to-tooth error," burrs, pin hubs, clamp-type and hubless gears, stainless steel vs nylon, pitch ranges, backlash, worn and wheel drives, etc. Pic Design Corp.

118 Worm Gear Reducers—Twelve-pp Catalog HSDR-58 features information on double reduction hollow shaft worm gear speed reducers. Contains parts indexes, unit dimensions, dimensions for high speed and slow speed shaft bores, plans and elevations of shaft arrangements, tables of weights, as well as complete horsepower, torque and overhung load ratings etc. Winsmith, Inc.

On pages 221-222 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

119 Roller Chain Sprockets—Catalog 6, 98 pp, describes design and construction features of a line of roller chains, sprockets, and conveyor chain attachments. Engineering formulas and installations are given, as well as dimensional data and diagrams, horsepower capacity charts, and other information essential in selection. Acme Chain Corp.

120 Variable Speed Belt—Described in this bulletin is a flexible, adjustable and laterally rigid belt designed to afford faster, easier installation, less vibration and exact speed control. Step-by-step photos show how to couple the belt. Manheim Mfg. & Belting Co.

121 Integral-Shaft Sheaves—Construction and operating features of Vari-Pitch integral-shaft sheaves for low-cost stepless speed control in large machine drives are given in 6-pp Bulletin 20B7897B. Tells how sheaves are available with lube systems designed to assure distribution of lubricants to all the moving parts. Allis-Chalmers Mfg. Co.

BULLETINS

(Begins on page 23)

122 Quick-Seal Couplings—Illustrated 30-pp Bulletin Q.S.R. 58 describes Quick-Seal couplings for hydraulic and pneumatic applications. Discusses three types of couplings—straight-through, single check-valve and double check-valve. Cross section drawings point out major features of component, and complete details for each type of coupling are given. Selection chart included. Titeflex, Inc.

123 Mill Motor Couplings—Design features and operation of company's mill motor couplings are detailed in Form 1049. Applications are described and typical mill motor coupling arrangements are illustrated. A table showing mill motor ratings and dimensions given. Koppers Co., Inc.

124 Pillow Blocks—Catalog 100, 8 pp, presents pillow blocks for heavy industry—a line including 20 basic housings that will accommodate 94 spherical roller bearings. Detailed specifications are given, showing how different end caps may be used with the one-piece housings to fit all series of spherical roller bearings. Price list included. Miether Machine Works.

FANS, VENTILATING

125 Rigid Plastic Fans—Fans made of polyvinyl chloride and claimed to offer exceptional chemical resistance with high structural strength in relation to weight are described in these two bulletins. Bulletin 9-20 describes centrifugal fans and Bulletin 9-21 details features of the twin-flow fans in sizes from 12 to 48 in. The Atlas Mineral Products Co.

126 Thermoplastic Exhaust Systems—Featured in this 10-pp bulletin are thermoplastic, corrosion-proof ventilating and exhaust systems, including centrifugal fans, ducting and fittings, fume exhaust hoods, and outdoor weather stacks. Tables of ratings and dimensions are included, also sizes. American Agile Corp.

MATERIALS HANDLING

127 Conveyor System—Bulletin 159 describes company's power and free overhead conveyor featuring selector dispatch head. Construction and operating features are illustrated, typical layout is diagrammed, and specifications included. Columbus McKinnon Chain Corp.

128 Roller Gravity Conveyors—This 48-pp handbook covers design, construction and application of roller gravity and wheel conveying systems. Easy-to-read charts and graphs are included to assist in matching conveyor to loads, as well as detailed engineering and dimensional data. Book is illustrated with photos of typical installations, as well as drawings and diagrams. Lamson Corp.

129 Scrap, Chip Conveyor—Steel belt conveyor systems for press scrap disposal, tubular conveyors for removing chips from individual or large number of machine tool units, and steel belt conveyors for removing turnings, chips and parts from machine tools are featured in 16-pp Brochure S-90. Photos of typical installations are included as well as a typical layout. Prab Conveyors, Inc.

130 Feeders and Conveyors—Catalog 930 is a 96-pp book covering electric vibrating feeders and conveyors. Controls, installation methods, operating principles, and individual unit specifications are included. Also presented are other vibrating equipment such as barrel packers and coolers and dryers, as well as magnetic separators and bin level indicators. The Jeffery Mfg. Co.

131 Vertical Conveyors—Bulletin 205 describes vertical conveyors designed to integrate horizontal floor conveyors in a multi-floor building. Advantages and typical installations are illustrated. Tamson Corp.

132 Belt Conveyor Idlers—Forty-pp Book 2716 contains engineering selection data on five new series and 23 types of belt conveyor idlers, emphasizing their application versatility. Lists idlers for belt widths from 14 to 48 in. Book is key indexed for easy reference, as an aid in selecting the exact idlers to match specific belt conveyor operating requirements. Photos and dimensional sketches provided. Link-Belt Co.

133 Hoists and Cranes—Eight-pp Bulletin DH-28 describes a line of motor-operated hoists, hand-operated hoists, jib cranes, hand-traveling cranes and motor-driven cranes. Contains data on general features, construction details, weights, dimensions, suspensions, specifications, clearances, accessibility. Wright Hoist Div., American Chain & Cable Co., Inc.

134 Automatic Bulk Handling—Bulletin 531, 12-pp, on new techniques for automatic bulk handling describes pneumatic conveying methods in integrated manufacturer. Describes two polyethlene handling installations to show how a system approach to air conveying solves complex handling problems. Photos and diagrams illustrate step-by-step material handling throughout production, high purity handling between plants. Dracço Div., Fuller Co.

135 Better Pneumatic Handling—How improved materials handling procedures have resulted when certain types of pneumatic equipment are arranged in selected conditions to supplement each other is discussed in this 12-pp article. Discusses applications of the Airslide pump and fluidizing conveyor. Fuller Co.

136 Truck Power Application—Detailed information on a method of power application for fork lift trucks based on the principle of hydrostatics is available in this 12-pp booklet. Describes operational features and components. Towmotor Corp.

137 Caster and Wheel—Catalog 130, 16 pp, illustrates and describes casters and wheels, including swivel and rigid casters available with moldon rubber, molded plastic, semi-steel, composition rubber, forged steel and pneumatic rubber tired wheels. Also listed are different sizes and variations of wheels in semi-steel, moldon rubber and molded plastic. The Hamilton Caster & Mfg. Co.

Postage-free Reader Service Cards make it easy to order bulletins. Cards are provided on pages 221-222.

138 Tote Pans—Featured in this 10-pp bulletin are fiber glass reinforced polyester tote pans designed for a variety of industrial handling applications. Advantages of construction and design are detailed and dimensions included. G. B. Lewis Co.

139 Storage Rack Guide—"Be Your Own Storage Rack Expert," is the title of this 24-pp informative booklet. Fundamentals of designing and constructing a storage rack with ordinary pipe and company's clamp used as the connecting device are detailed. Dimensional data and requirements are listed and clear-cut diagrams included. Tube-Strut Corp.

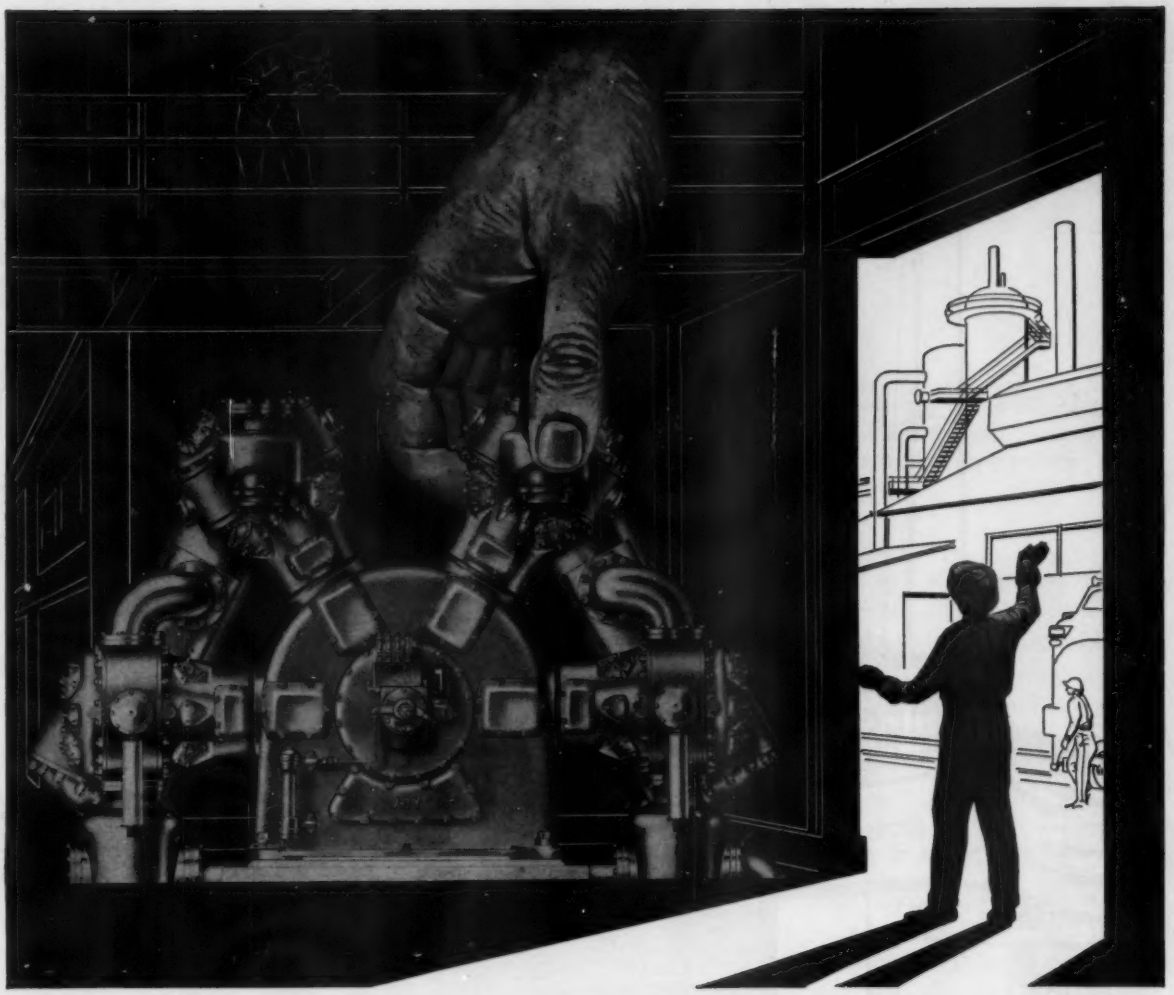
TOOLS, MACHINE SHOP

141 Pneumatic Tools—Described in Catalog PT-58, about 12 pp are portable pneumatic production tools including grinders, attachments and accessories, wire brushes, hose and fittings, air line controls. Provides design features, application suggestions, sizes. Thomas C. Wilson, Inc.

142 Do-It-Yourself Parts—"How to Make Your Own Machine and Repair Parts. . .", 24 pp, is designed to help solve maintenance and repair part problems. Covers care and trouble-shooting of machines and equipment, also machining and welding techniques; contains drill hole tolerances and grinding limits chart. Many types of parts are almost universal in their use, and this booklet pictures a number of these with descriptive case histories covering use of Stressproof, a high strength all-purpose steel bar. LaSalle Steel Co.

143 Lube Application Guide—Form C 10 W, 32 pp, presents recommendations covering the lubrication of industrial and other machinery. Fully indexed, both by product and purpose, this book covers cup greases, bearing greases, gear lubes, high temperature lubricants, tool lubricants, cable treatments, as well as cutting oils, penetrating oils, others. Application devices are also described. Keystone Lubricating Co.

(More Bulletins on page 223)



SET A 500 TO 1000 HP AIR COMPRESSOR IN THE CORNER OF YOUR PLANT . . . *almost as easy as this*

IF YOUR EXPANDING PLANT FACILITIES are requiring more compressed air . . . *and* putting a squeeze on plant space, here's the answer . . . the *new* Joy WN-224 compressor. Because of its compact semi-radial design, the WN-224 is delivered as a package—completely assembled—ready to go. Just bolt it down, connect power, water, and air lines . . . and you're ready for long, continuous service. This is the only true "package" compressor available in these capacities . . . 2418 to 6048 cfm . . . horsepower ratings from 350 to 1000.

AND THE WN-224 SOLVES YOUR SPACE PROBLEMS . . . it can be installed where no other compressor of equal capacity will fit. Instead of long, horizontal units on massive foundations, the Joy WN-224 has four cylinders arranged semi-radially around the frame. This compact, balanced arrangement assures smoother running, gives longer service with far less maintenance. Get the whole story on the WN-224 from ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

WAW 1 6666-179

Write for FREE Bulletin 179-15

JOY . . . EQUIPMENT FOR INDUSTRIAL PLANTS . . . FOR ALL INDUSTRY

Industrial Compressors

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Electrical Connectors

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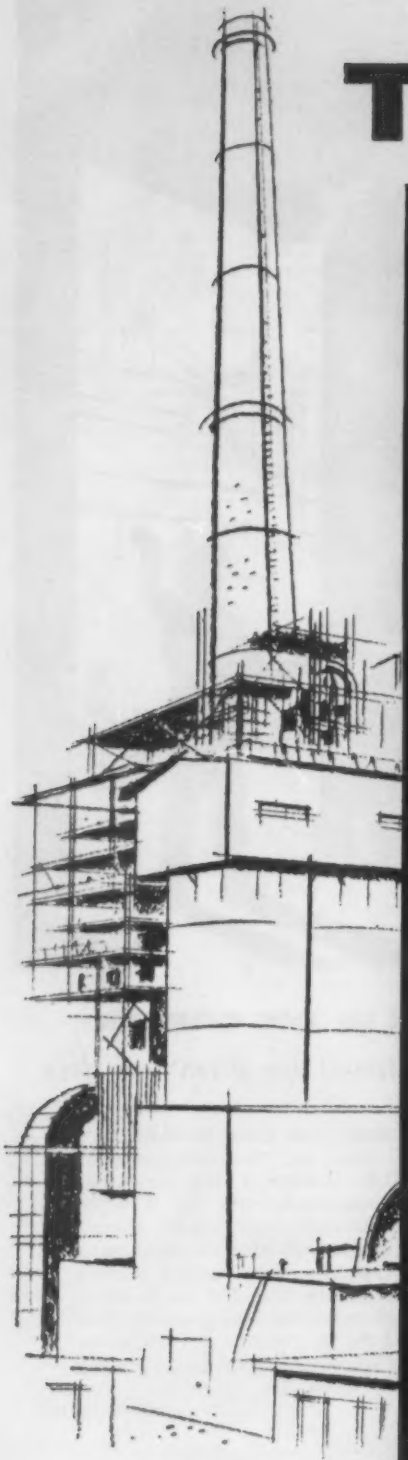
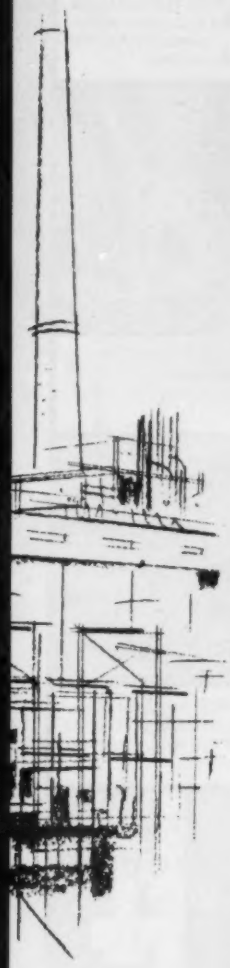
TWO EASY



WAYS TO REDUCE PLANT MAINTENANCE



Now, more than ever, plant engineers and maintenance men specify Garlock GUARDIAN* Gaskets and LATTICE-BRAID* Asbestos Packings for safe, long lasting prevention of equipment failure due to high pressures and temperatures. Here are their reasons:

GARLOCK GUARDIAN GASKETS

adjust themselves automatically to maintain positive seal when pressures and temperatures change. No need to retighten bolts periodically. They are constructed of spiral wound strips of V-shaped steel, alternated with layers of asbestos . . . this enables GUARDIAN Gaskets to "spring" back to shape after compression. Also permits using lower bolt loads. Use them on boiler manholes, handholes, tube plates, and pipe flanges, where pressures rise as high as 2500 psi, temperatures to 1050° F. Available in round, oval, square, oblong, diamond, and pear shapes; practically any size and in thicknesses 1/8", .175", and 1/4". Write for Catalog AD-104.

GARLOCK LATTICE-BRAID ASBESTOS PACKINGS

require less gland pressure than conventional packings; accordingly, they require adjustment less often. Moreover, LATTICE BRAID outwears all conventional packings thus reducing downtime for repacking. Why? Because LATTICE-BRAID is made of a through-and-through braided construction; each strand passes diagonally through the packing body at a 45° angle, resulting in a unified structure of greater strength. The strands hold together even when the packing is worn far beyond the limits of ordinary braided packings. Next time, repack reciprocating rods or pump shafts with LATTICE-BRAID. See for yourself why so many others use LATTICE-BRAID asbestos packing against steam, oils, gases to 700° F. Write for Catalog AD-131.

Both these products are part of the Garlock 2,000 . . . two thousand different styles of packings, gaskets, and seals for every need. The only complete line . . . that's why you get unbiased recommendations from your local Garlock representative. Call him for further information.

THE GARLOCK PACKING COMPANY, Palmyra, N. Y.

For Prompt Service, contact one of our 30 sales offices and warehouses throughout the U.S. and Canada.

*Garlock Trade Mark

GARLOCK

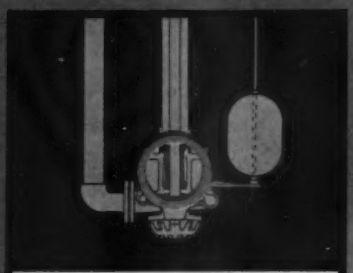
Packings, Gaskets, Oil Seals, Mechanical Seals, Molded and Extruded Rubber, Plastic Products

CANADIAN DIVISION:
The Garlock Packing Company of Canada, Ltd.

PLASTICS DIVISION:
United States Gasket Company

For more facts circle 516 on Reply Card

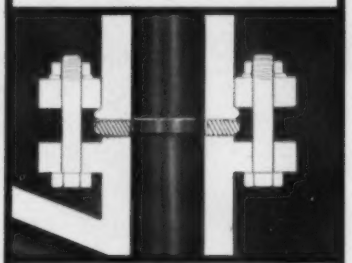
Reduce costly downtime and maintenance...



BEARINGS of a Du Pont TFE resin have lasted for more than two years in this nitric acid pump . . . save almost $1000 of maintenance costs per year.

VALVE SEATS of a TFE resin seat easily and tightly, cost little, save over $5000 per year in handling a sand-like chemical slurry.

5-MIL TAPE of a TFE resin lines vibrating trough. Liner prevents sticking of salts, provides constant feed, eliminates continuous maintenance.



GASKETS of a TFE resin handle hot concentrated HNO_3 and H_2SO_4 at 410°F. Gaskets like these can be cut from standard sheet or tube.

by stocking standard shapes of TEFLON TFE-fluorocarbon resins

Cut costly downtime by fabricating your repair parts from standard shapes of TFE-fluorocarbon resins. Standard shapes offer you a quick and economical solution to many of your maintenance problems.

The resins provide a combination of valuable properties. You can use parts cut from standard shapes to replace worn-out seals, gaskets and packings because of the superb sealing properties of TFE resins. The parts you make will withstand high temperatures because TFE resins are rated for continuous use to 500°F. Thanks to the exceptionally low surface friction of these tough materials, you can easily fabricate "self-lubricating" bearings and large-area sliding surfaces. TFE resins give you extreme chemical inertness wherever you need to handle corrosives. They are among the best electrical insulation materials known.

See your local supplier of TFE resins now for a good selection of standard shapes, and start saving on repairs and downtime. For additional information, see other ads on standard shapes of TFE resins in this issue. Or for our new booklet . . . "*How to Use Sheets, Rods, Tubes, Tape and Other Standard Shapes of TEFLON*", write today to your local supplier or to: E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Dept., Rm. T-333, Du Pont Bldg., Wilmington 98, Delaware.

In Canada: Du Pont of Canada Limited, P.O. Box 660, Montreal, Quebec.

Unlike many other non-metallic materials, articles of TEFLON TFE resins can be ordered against meaningful specifications to insure your receiving a standard product. Your supplier, who fabricates TFE resins, is prepared to furnish you with stock shapes in the best combination of sizes and the best combination of properties.

DU PONT REG. U.S. PAT. OFF.

TEFLON®

TFE-FLUOROCARBON RESINS

TEFLON *is Du Pont's registered trademark for its fluorocarbon resins, including the TFE (tetrafluoroethylene) resins discussed herein.*

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

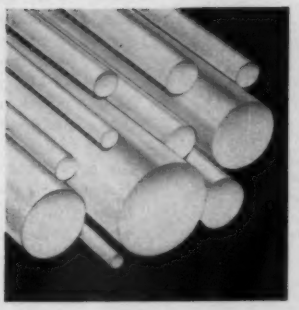
For more facts circle 517 on Reply Card

Cadillac Announcement

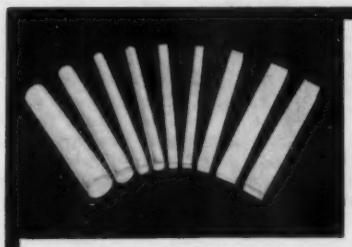
We now manufacture standard Teflon shapes!

CADILLAC PLASTIC and CHEMICAL COMPANY

COMPLETE STOCKS IN 11 WAREHOUSES COAST-TO-COAST

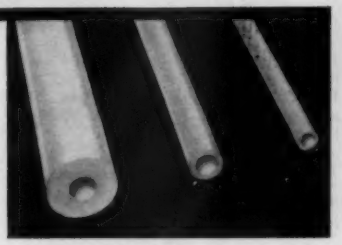


Cadco Teflon Rods
Finest quality, non-porous. Can be turned quite easily like soft brass on any standard metal working lathe. Complete range of diameters and lengths.



Cadco Bars and Cylinders
Triple "A" quality and uniform density. Easily machined. Available in various diameters and wall thicknesses. Also made to your specifications.

Cadco Teflon Sheets
In a wide range of sizes and thicknesses. Can be sawed, drilled, punched, stamped and sheared.



Cadco Teflon Tubing
Flexible and tough. Has wide useage for electrical, chemical laboratory and other applications. Complete range of diameters and lengths.

"cadco"

Manufactured

TEFLON SHAPES

SHEETS • TAPE • TUBING

RODS • BARS • CYLINDERS

Cadco Teflon Tape
Non-porous and extremely strong. Available in grades for mechanical, electrical and general purpose use.

In our new ultra-modern plant . . . "CADCO" brand TEFLON is manufactured under the most rigid controls to assure you of uniform high quality. Large production capacity enables us to maintain complete inventories for quick delivery on all orders.

Send for new "Cadco" Teflon Brochure and prices.

WRITE NEAREST ADDRESS OR REQUEST NAME OF DISTRIBUTOR IN YOUR CITY

cadillac plastic and chemical company

Detroit 13, Michigan, 15111 Second Blvd.

Chicago 6, Illinois, 727 W. Lake St.
Cleveland 13, Ohio, 3333 Detroit Ave.
Cincinnati 10, Ohio, 1200 Walnut St.
Milwaukee 2, Wisconsin, 517 N. Broadway St.
Los Angeles 57, Calif., 2305 W. Beverly Blvd.
St. Louis 3, Missouri, 2111 Olive St.
Kansas City, Missouri, 1517 Grand Ave.
Dallas 7, Texas, 2546 Irving Blvd.
San Francisco, Calif., 313 Corey Way
Houston, Texas, 6426 Long Drive

HEADQUARTERS FOR NEW IDEAS

Tuffy Tips —on safe use of Slings and Hoist Lines

Professional Weight Lifters Work the Safety Angles

Here's a tip that could save an injury and absenteeism. The weight lifter's secret is proper leverage. Plus use of major leg muscles instead of back muscles. The weight lifter never leans over to pick up the load. He squats down as near as possible to it, and keeps his back erect all the time. Lifting action comes from legs and thighs. If you must use muscle for some of the lighter lifting jobs, these points are worth remembering. But wherever possible—and always for heavy loads—use hoists and slings.

How to Play It Safe When Loading Slings and Hoist Lines

1. **Keep pull on sling legs in a straight line.** Never shorten legs with knots or I-bolts. If choker and basket hitches are used on slings, check rated load limits.

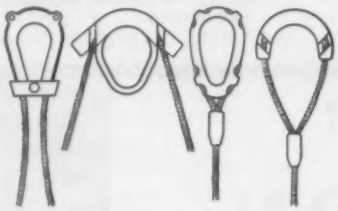
2. **Load slings on the center of hooks.** Never at their points, except for hooks specially designed for point loading.

3. **Never use load hooks that are bent open.** They have been overloaded, and may drop loads with disastrous results. Same goes for defective chain blocks. Insist that your men report them at once.

4. **Lubricate wire ropes at regular recommended intervals,** with lubricant recommended by your local oil company engineer.

Proper Fittings Can Give Slings Added Safety and Service Life

The sling eye is usually the point of greatest wear in load handling. The proper sling fitting acts as a shield to take the brunt of this wear—the load shocks, abrasion and other stresses concentrated in the eye. Shown here are some of the Tuffy fittings you can have factory-installed in your Tuffy Slings, or they can be installed in your own rigging loft. Left to right: (1) **Equalizing Thimble** permits adjustment of the length of sling legs so that loads of varying dimensions may be picked up and handled on an even keel. (2) **Newco Sling Bridle** will not slip when handling unbalanced loads. (3) **Newco Slip-Thru Thimble** allows passage of an identical thimble through its eye—necessary when a regular sling is used as a choker sling. (4) **Newco Slip-On Thimble** eliminates flattening or pulling together of eyes under heavy loads; can be attached or removed in seconds.



Tuffy Sling Stamina is Matched in Tuffy Hoist Line

Tuffy Hoist Line is a special rope construction for use on all types of overhead cranes, derricks and clamshells. Like all Tuffy Special Purpose Ropes, it has the right combination of strength, flexibility and toughness for greatest safety and longest life in its specific range of uses. Tuffy Slings and Hoist Line make a team that cuts hoisting costs and downtime in every type of materials handling.

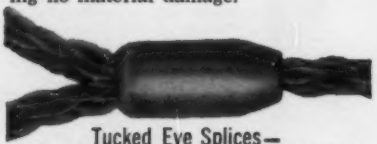
Your Tuffy Distributor Offers the Most in Service and Savings

Tuffy Braided Wire Fabric: Successor to Wire Rope in Slings

The unique machine-braided construction of Tuffy Slings provides a combination of "free flowing" flexibility and toughness never possible with ordinary wire rope. The difference is in the patented 9-part fabric, braided by precision machines in a process that eliminates inequalities of hand-braiding.

Kinks Are No Hazard with Tuffy Slings

One of the first rules of safety: never use a wire rope sling that has been kinked. The wires are permanently bent, damaged or weakened. Not so with Tuffy Slings. Tuffy's patented, 9-part machine braided fabric is just about impossible to kink. And if it does, under some unusual condition, you can straighten out the kink, leaving no material damage.



Tucked Eye Splices— Gripped in Steel for Strength and Safety

This Tuffy ferrule, slipped over the tuck-splice of the eye and pressed on under tremendous hydraulic pressure, holds so tight that it gives the eye splice 100% of fabric strength. The ferrule itself is smoothly tapered to meet the main body of the sling. No abrupt edges or rough projections to injure hands and slow down work. The extra life, efficiency and safety of Tuffy's pressed-on ferrule is yours at no extra cost!

FREE! New Tuffy Sling Handbook

Revised and enlarged edition of this famous sling manual. Covers slings from A to Z. Types, dimensions, weights, rated loads, fittings. Even includes safety-approved standard signals used in operation of various equipment. Send for your free copy now. Union Wire Rope Corporation. Specialists in high carbon wire, wire rope, braided wire fabric and stress relieved wire and strand. 2224 Manchester Ave., Kansas City 26, Mo.

S2

UNION Wire Rope

ARMCO®

Subsidiary of ARMCO STEEL CORPORATION

OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company
Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Southwest Steel Products

For more facts circle 519 on Reply Card

now–a fire safe rust preventive to solve your production coating problems

New . . . out of Dearborn's research laboratories . . . a revolutionary water base rust preventive—SAFEGARD!

Think of it. No obnoxious fumes. No soluble oil ingredient. No fire hazard to multiply your insurance costs. Safegard drains quickly . . . saves time . . . reduces housekeeping problems.

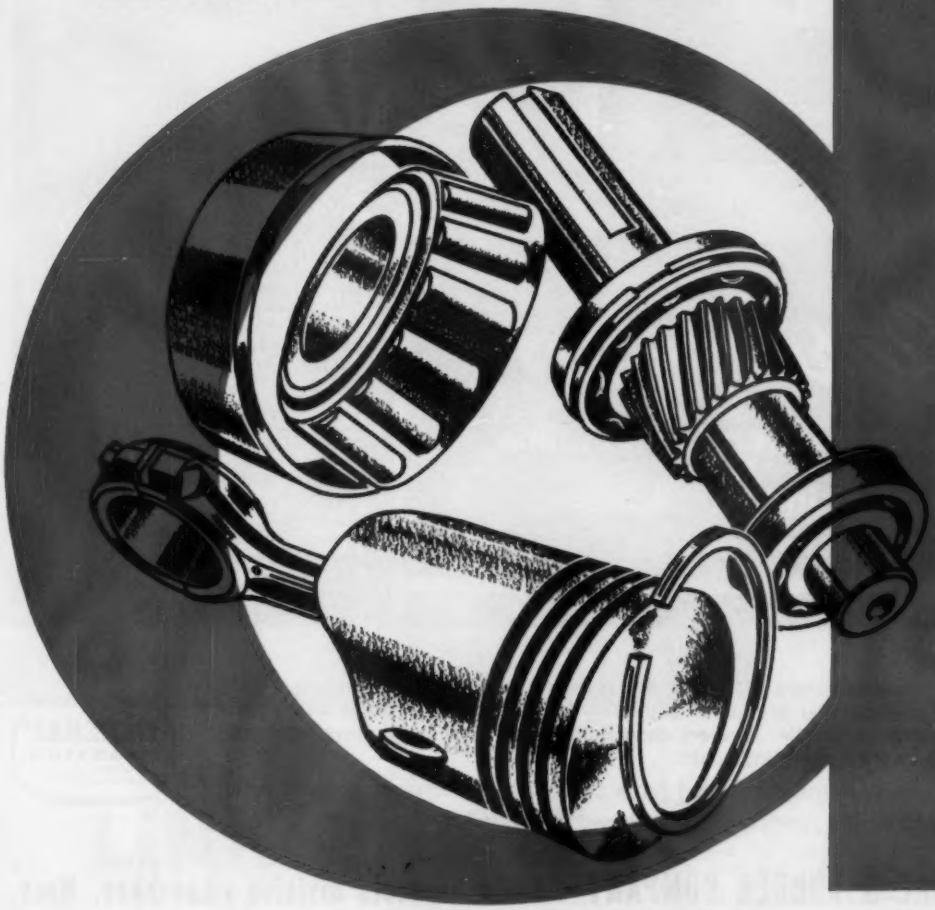
Treated parts may be stored indoors or out . . . shipped anywhere under any conditions of climate or humidity including salt air . . . assembled "as is" or cleaned for any specific requirement with one of Dearborn's easily applied formulas.

Safegard has already proved its effectiveness in plants of four of the nation's largest manufacturers. Perfect performance and overall economies as high as 50 percent have been reported.

Now, it is ready for you. Write or wire for detailed information and "in use" case histories.

DEARBORN CHEMICAL COMPANY

Merchandise Mart Plaza • Chicago 54 • Manufacturing Plants: Chicago • Linden • Los Angeles • Toronto • Honolulu • Havana • Buenos Aires



pioneer in the science of corrosion control

dearborn

For more facts circle 520 on Reply Card

Industrial Plastic Fabricators, Inc. proves . . .

Complete Boltaron 6200 installation... ducts, tanks, hoods, blowers.

Boltaron 6200 ductwork & fans with stacks going through the roof.

Boltaron® 6200

is the best answer for handling chemical & industrial fumes

Boltaron 6200 IS BEST BECAUSE:

- Protects against most corrosive fumes and liquids in any combination.
- Resists build-up of residual materials from corrosive fumes and liquids.
- Solid Boltaron has no coatings to peel or chip —does not require recoating or repainting.
- Chemically inert.
- Non-toxic, imparts no taste or odor.
- Can be welded, bolted, threaded, milled, ground, buffed and polished.
- Non-sparking—will not support combustion —handles fumes and liquids.
- High dielectric strength.
- Extremely lightweight—non-porous—and smooth surface.
- Tensile strength is 8000 psi.
- Can be joined by heat welding, solvent cementing, and threading.

Many progressive U. S. manufacturers are using IPF systems fabricated from Boltaron 6200 to solve a wide variety of industrial problems, especially where corrosive fumes and liquids have been extremely costly to handle. In every case Boltaron 6200 systems have increased operating efficiency—decreased operating costs.

For further information on performance-proven fume collectors and exhaust systems write: Industrial Plastic Fabricators, Inc., Endicott Street, Norwood, Mass.

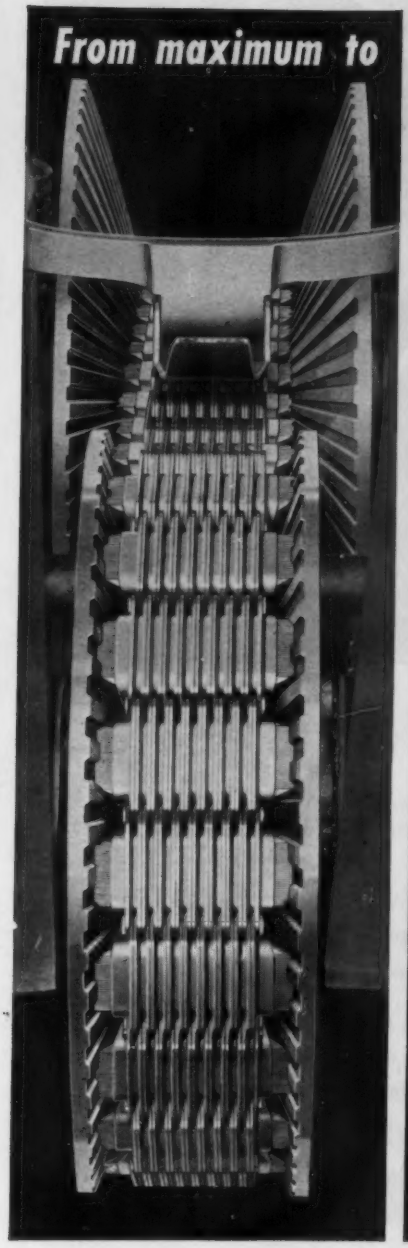
GENERAL® PLASTICS
The General Tire & Rubber Company

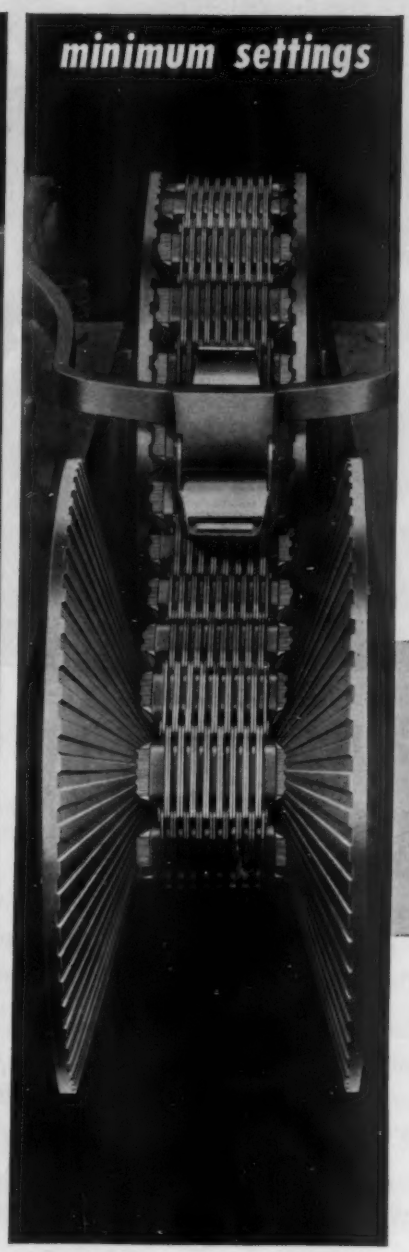
THE GENERAL TIRE & RUBBER COMPANY • Bolta Products Division • Lawrence, Mass.

For more facts circle 521 on Reply Card

For positive, accurate speed control

...there's nothing like P.I.V.

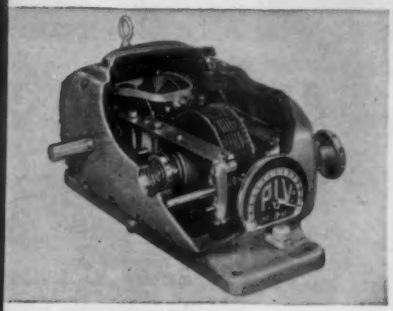




VARIABLE from top speed to minimum speed with no steps, no stops in between. That's Link-Belt P.I.V.—the *only* chain-driven variable speed drive. Teeth—not tension—permit instant ratio changes with no loss of speed, regardless of load conditions.

Slippage? Not a chance—P.I.V.'s chain-to-wheel grip is positive as a gear. In fact, this is industry's most accurate, most reliable mechanical variable speed drive.

Your Link-Belt office or authorized stock-carrying distributor has Book 2274 on P.I.V. drives from ½ to 25 hp. Refer to the yellow pages of your local phone directory under Power Transmission Equipment.



HOW P.I.V. WORKS. Exclusive self-tooth-forming chain of P.I.V. consists of packs of free-sliding steel slats which serve as teeth. Chain grips beveled grooves on pairs of conical wheels located on input and output shafts. Speeds are changed by varying the effective diameters of the wheels, as shown at left.

P.I.V. LINK-BELT VARIABLE SPEED DRIVE

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14.813

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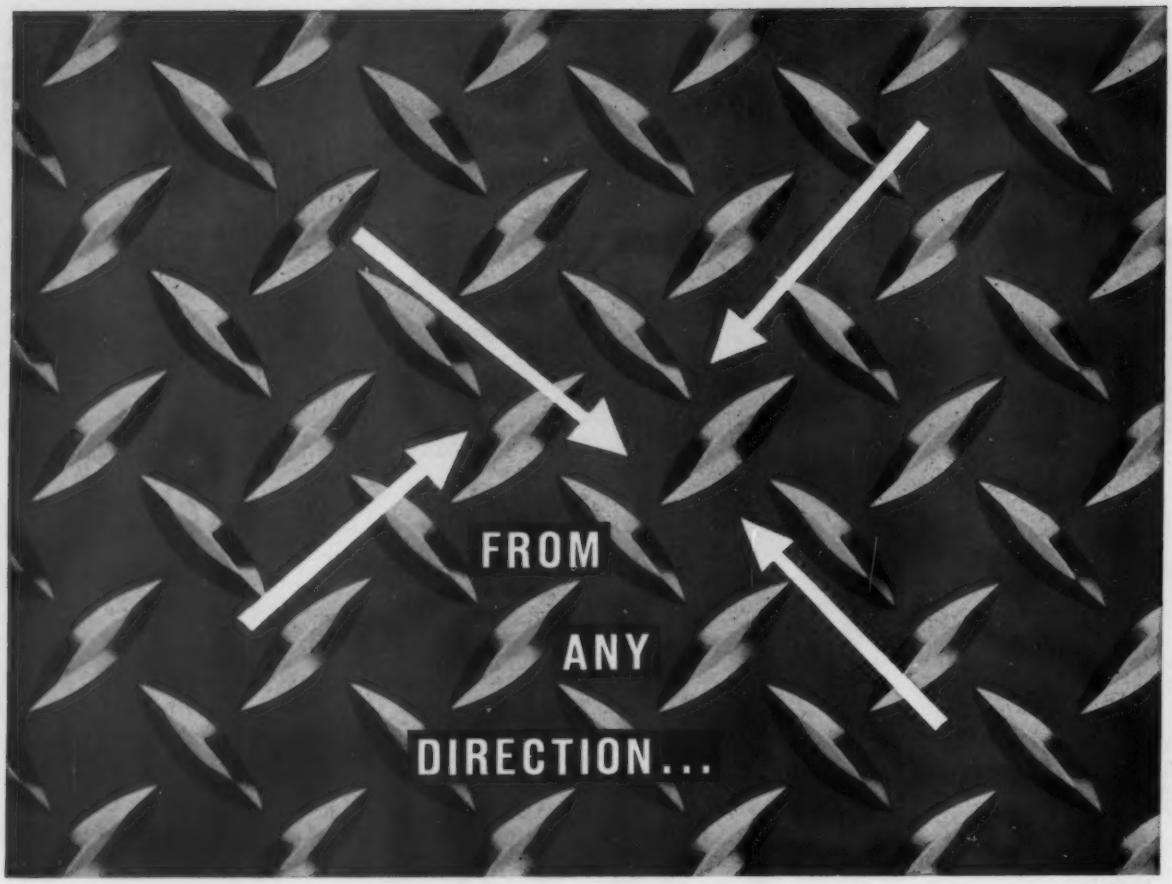

Alan Wood Super Diamond floor plate ...is easy to clean

Sweep it . . . hose it . . . mop it . . . at any angle, A. W. Super Diamond is easy to clean. No pockets to hold dirt or water . . . the unique design of this rugged floor plate lets water drain quickly in any direction.

A. W. Super Diamond is easy to fabricate, too . . . it can be sheared, welded, formed, and easily matched. The arrangement of the exclusive pattern allows you to bend it at any place. This is a heavy duty floor plate that will last for years . . . and provide a safe, non-skid footing.

For easy cleaning . . . for easy fabrication and installation . . . for long wear . . . specify A. W. Super Diamond. Write for Bulletin SD-N3

ALAN WOOD STEEL COMPANY

CONSHOHOCKEN, PA.

DISTRICT OFFICES: Philadelphia • New York • Los Angeles • REPRESENTATIVES: Atlanta • Boston • Buffalo Cincinnati • Cleveland • Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle Montreal, Toronto and Vancouver, Canada—A. C. Leslie & Co., Ltd.

For more facts circle 523 on Reply Card

RELOCATE MACHINES FAST *or change plant layout without stopping production!*

FRANK ADAM *Aluminum* BUSDUCT

Plug-in outlets every 10" provide power *where* you want it . . . *when* you want it by simply inserting a protective plug-in device. No long lead-ins . . . no voltage drop!

Lighter but stronger Frank Adam Aluminum Busduct is easier to handle—takes less time to install—lowers initial cost—eliminates production slow ups when regrouping or relocating of machines and equipment is necessary.

If you want the finest in power distribution equipment, specify and insist on money-saving Frank Adam Aluminum Busduct.

Send for Catalog!

FRANK ADAM HIGH EFFICIENCY FEEDER BUSDUCT

Specially designed for conducting heavy current from service entrance to point of use. Copper or aluminum conductors . . . 2, 3, and 4 conductor solid neutral types . . . 600 to 4000 amp. capacity . . . up to 600-v. AC.

Entire length of Frank Adam Power Plugin Busduct is electro silver-plated. Aluminum or copper bus bars. 250 to 1500 amp. capacity . . . up to 600-v. AC . . . fusible or circuit breaker plug-in units.

See our catalog in SWEETS

Frank Adam ELECTRIC COMPANY

P. O BOX 357, MAIN P. O. • ST. LOUIS 66, MO.

busduct • panelboards • switchboards • service equipment • safety switches • load centers • Quikheter

For more facts circle 524 on Reply Card

$Ca^{++} + 2Na^{+} \rightarrow CaZ + 2Na^{+}$

DOUBLE TROUBLE STOPPED by CHEMPRO TEFLON*

In high speed pumps handling highly corrosive chemicals, Chempro Teflon has drastically cut pump down-time caused by scored shafts and short packing life.

"Scored" Shafts

eliminated by using CHEMPRO TEFLON SEAL CAGES†. Last many times longer than metal lantern rings under continuous corrosive attack. Snap on and off shaft quickly and easily. No vibration at high speeds. Can stand high gland pressures.

†Patented

Short Packing Life

solved by using CHEMPRO TEFLON RING PACKINGS. Give months of leak-free service compared with days and even hours for conventional packings. Require only slight gland pressure. Low coefficient of friction often makes lubrication unnecessary.

Complete information given in Bulletin CP552

*duPont Trademark

CHEMICAL & POWER PRODUCTS, Inc.

7 Broadway, New York 4, N.Y.

For more facts circle 525 on Reply Card

BACKTALK AND FORETHOUGHTS

Edited by Marjorie E. Weissman

Condensate Load Charts

PLANT ENGINEERING:

"Your October issue of PLANT ENGINEERING has just crossed my desk and the article titled 'Chart for Sizing Condensate Loads' by William G. Steinmiller, which appears on pages 108 and 109, is of interest to me. Since the magazine circulates in our office to other engineers, I do not wish to mutilate it by tearing out pages. With this in mind, I would like to know if I could obtain a set of tear sheets of this article." *E. R. Hottenstein, Mechanical Engineer, Nuclear Energy Div., Gilbert Associates, Inc., Reading, Pa.*

▸ When tear sheets are available, there is no need to rip the office copy of PLANT ENGINEERING. We are glad to fill tear-sheet requests as long as our supply lasts.—*Editors.*

Want To Remove Some Paint?

PLANT ENGINEERING:

"In the November, 1958 issue of PLANT ENGINEERING, in an article by R. E. Bley and D. M. Roche on painting, two paint removal devices are illustrated on page 114 in Figure 2.

"Will you please advise where we may obtain descriptive literature on these items? They are described as flexible steel blade tool and flexible sanding disc." *J. H. Mallinson, Senior Staff Engineer, American Viscose Corp., Front Royal, Va.*

▸ The tools mentioned in the article "Preplan Your Painting Program" are "Roto-Scraper" and "Grind-O-Flex." They are made by the Roto Scraper Co., 2960 West Valley Blvd., Alhambra, Calif., and Merit Products, Incorporated, Culver City, Calif., respectively.—*Editors.*

Using Color for Safety

PLANT ENGINEERING:

"Some years ago, an article appeared in your publication recommending the colors best suited for painting various types of plant equipment and installations in order to promote maximum safety and efficiency.

"If you could let me have a reprint of this article, I should be very grateful.

"I should very much like to give you a more definite reference but I have been unable to determine when the article was published. My best recollection is that it was between 1953 and 1956. Perhaps you will recall the article to which I am referring." *Leonard H. Cohan, Production Manager, Hanline Brothers, Baltimore, Md.*

▸ We hope that "Color Conditioning," (April, 1954) and "Putting Color to Work," (December, 1957) will be of assistance.—*Editors.*

Dry Film Lube Reprint

PLANT ENGINEERING:

"It is with a great amount of interest that I read your article 'Where To Use Dry Film Lube' in your last December's issue.

"I don't know just what procedure I must go through to get permission to send excerpts of that article to our sales representatives but I would like very much to do so if permission could be granted.

"I wrote a letter of appreciation of the article to its author, Ralph E. Crump.

"I shall be looking forward to hearing from you regarding the foregoing." *L. N. Sprecher, Development, Rilube and Associated Products, Modern Industrial Plastics, Inc., Dayton, Ohio.*

▸ The procedure for obtaining permission to reprint articles that have been published in PLANT ENGINEERING is simple—just ask. In turn, we ask only that a credit line be given to this magazine.—*Editors.*

How Much Does Maintenance Cost?

PLANT ENGINEERING:

"We here at Raytheon are in the infant stages of a standard costs program for plant maintenance work. Since we are a rapidly expanding company, our maintenance requirements are frequent.

"The immediate objective of our standard costs program is a better realization of what particular maintenance activities have cost us in the past. The major difficulty we are faced with is finding some system of assessing a unit cost for a particular job, such as the installation of an outlet in a maintenance shop order which called for a variety of electrical or multi-trade activities on the same shop order. The only accounting figures

$$Ca^{++} + Na_2Z = CaZ + 2Na^{+}$$

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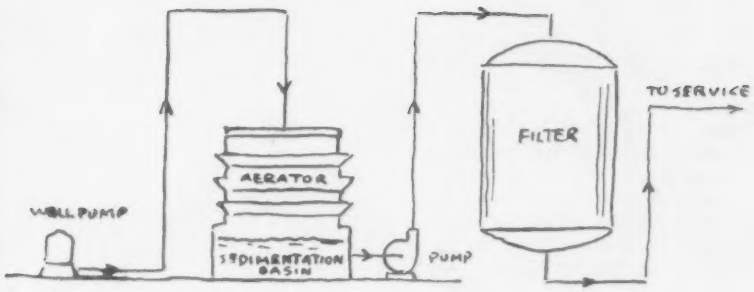
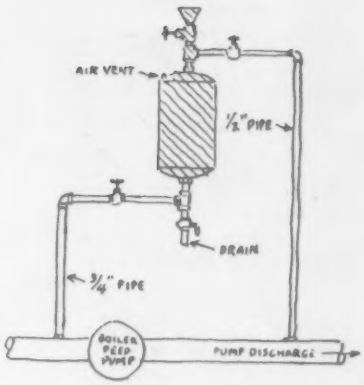




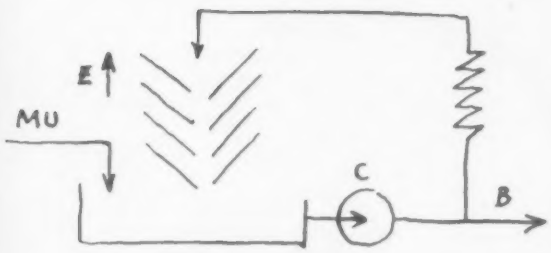
$$V = \frac{18.50^2 (S_1 - S_2)}{Z}$$

$$\frac{x}{m} = KC^{1/n}$$

any way you figure it,

the best solution to your

water problems is . . .



■ CONSULTANTS ON INDUSTRIAL WATER PROBLEMS

BETZ LABORATORIES INC., Philadelphia 24, Pa.

STOP WORRYING

ABOUT FLEXIBLE TUBING PROBLEMS

PENFLEX
Has The Answer

. . . with a complete line of all types and sizes of flexible metallic tubing . . . plus "Flexineering." That well-known technical help of Penflex engineers on your specific design, application and installation . . . plus the "know-how" to supply just the right flexible tubing you need.

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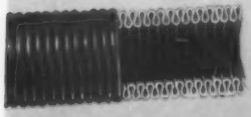
Penflex Interlocked Hose



Penflexweld All-Metal Tubing

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TIGHT AS A PIPE BUT...
FLEXIBLE

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BACKTALK— FORETHOUGHTS

we have are the total trade costs for the shop order and no way of telling how much was for individual jobs done by a trade under the same shop order.

"We are also interested in proper criteria for measurements for different maintenance work. What are the proper measures for a per unit basis? In the area of millwrights, we have assigned one unit per millwright that an article of furniture requires. This has proved to be a good unit of measurement.

"I should appreciate your referring me to any articles, bulletins, or data file on the subjects menioned above." *Harvey White, Industrial Engineering Section, Raytheon Manufacturing Co., Wayland Laboratory, Wayland, Mass.*

▶ We have forwarded tear sheets of several articles which we believe will be useful to Mr. White. We should like to suggest that readers who have information get in touch with Mr. White.—*Editors.*

De-Scaling Pistol

PLANT ENGINEERING:

"Am very much interested in the Von Arx air pistol illustrated in the current issue of your magazine, PLANT ENGINEERING.

"Any information that you could forward to me would be greatly appreciated." *E. D. Yanne, Plastics Div., Monsanto Chemical Co., Springfield, Mass.*

▶ The many requests we have received for further information on the Von Arx de-scaling pistol have been forwarded to Mr. P. J. Vomouras of The Marindus Co., 52 Wall St., New York 5, N.Y.—*Editors.*

Gas Concrete for Building

PLANT ENGINEERING:

"We have noticed with great interest, an article in your December, 1958 issue on 'Durox' building material. We have many questions and would like very much to get more complete information.

"Could you send us the names and addresses of suppliers, strength of this material, load and carrying ability, and information on installing it on a sloping roof. It would also be very helpful to have information on methods of fastening this material to wooden purlins." *H. M. Rogers, Jr., Engineering Dept., Charles Pfizer & Co., Inc., Groton, Conn.*

PLANT ENGINEERING:

"Please send us complete information regarding Durox, which is referred to on page 94 of your December, 1958 issue of PLANT ENGINEERING.

We would like to have as much information as possible regarding this product and also know something about the cost of same." *H. L. Brandau, Huttig Manufacturing Co., Muscatine, Iowa.*

► We are forwarding inquiries to the manufacturer, the U. S. Durox Corporation of Colorado.—*Editors.*

Slide Rule Available For Calculating Noise Factor

PLANT ENGINEERING:

"Will you please tell me where the slide rule type of noise calculator, mentioned by Reuben A. Gerlitz in the article 'Know Your Noise Factors' from the December, 1958 issue of PLANT ENGINEERING, can be obtained and the price of same." *Earl M. Bruce, Safety Engineer, Great Northern Paper Co., East Millinocket, Me.*

PLANT ENGINEERING:

"In your December, 1958 issue of PLANT ENGINEERING, you have an article on page 80 entitled 'Know Your Noise Factors.'

"We would like to obtain 35 copies of this article and would appreciate your advising the price and how to go about ordering these." *C. W. Bruce, Chief Engineer, Steel Plants, Republic Steel Corporation, Cleveland, Ohio.*

PLANT ENGINEERING:

"If any are available, I would like to have a reprint of the article 'Know Your Noise Factors' by Reuben A. Gerlitz, from PLANT ENGINEERING for December, 1958.

"I also would like to have one of the slide rules mentioned by the author and the detailed calculations for the formula $Q = SN^{0.3}$ as noted at the end of the article." *G. E. Parsons, Hercules Powder Co., Wilmington, Del.*

▶ A copy of the detailed explanation of the formula $Q = SN^{0.3}$ has been forwarded to readers requesting it.

The slide rule incorporating the principles set forth in the article was devised by the author and is available from him. His address is Reuben Gerlitz, Chief Engineer, Propellair, Div. of Robbins and Myers, Inc., Springfield, Ohio. We understand the cost is nominal.—*Editors.*

POWELL

LUBRICATED PLUG VALVES

Powell Lubricated Plug Valve, worm gear operated. Fully enclosed gear housing is a safety feature and protects against injuries and damage from the elements and tampering.

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- Tapered plug assures positive seating.
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Powell Lubricated Plug Valves are available in sizes ½" through 16", depending on the type required—Semi-steel 175 and 200 pounds WOG; Carbon Steel ASA 150 and 300 pounds.

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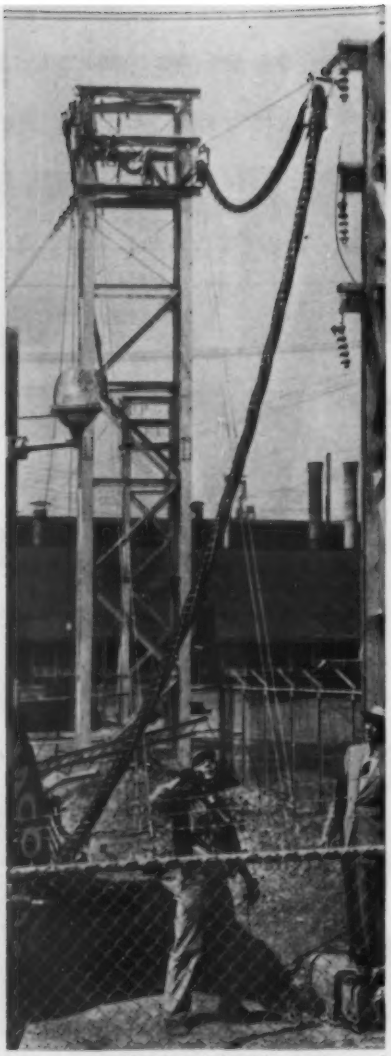
For more facts circle 529 on Reply Card →

Quickly installed aerial cable. Here's an application where 600-volt Durasheath was quickly installed and easily terminated. Durasheath's neoprene jacket resists weather, abrasion, heat, fumes. Assured: dependable performance and long-range economy!

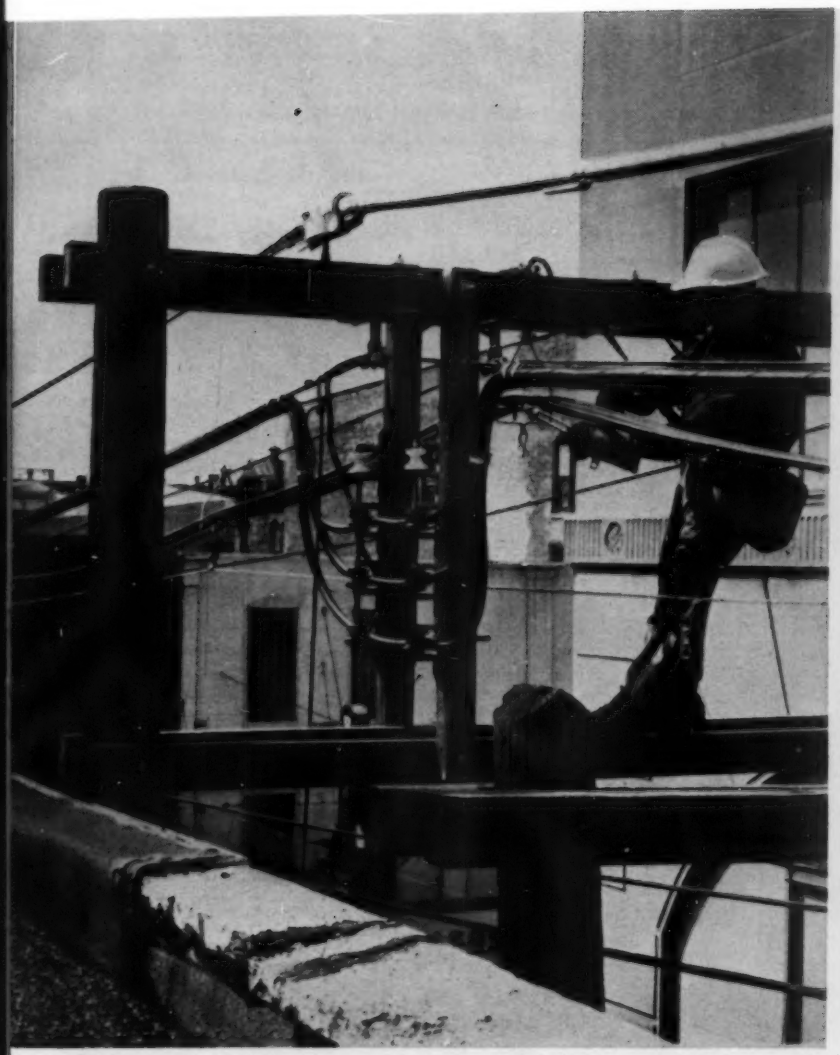


Factory-assembled aerial cable, made up of 3 single-conductor 15-kv Durasheath cables. Easy splicing, tapping and terminating meant simplified installation in the job shown here. No ducts, crossarms or insulators were needed. Wiring is neat, safe.

Direct-burial cable. The moisture-, oil-, and acid-resistance of Durasheath's jacket makes it the ideal cable for direct-in-the-ground applications like the one shown above. Its flexibility cuts installation time and cost because Durasheath is easy to handle. Its durability cuts maintenance costs!

Look at the ways you can save installation time and cost—with dependable Anaconda Durasheath Cable!

Wherever you want...whenever you want—this versatile power cable lets you install circuits fast... easily... at low cost! Use it aerially... in ducts... underground—in long runs with minimum splicing, indoors or out!



Field-assembled aerial cable. Versatile Anaconda Durasheath power cable was quickly field-assembled into aerial cable with the simple spinning operation shown here. Additional Durasheath was run along the building, grouped in a neat assembly by insulators and straps. It's another example of the way dependable Anaconda Durasheath adapts itself to your power cable needs—whether indoors, outdoors or both. Check into Anaconda Durasheath power cable for your wiring plans!

Installed in ducts. Durasheath's flexibility meant quick and easy installation here. And once installed, its tough neoprene jacket assures long, trouble-free life. Because Durasheath adapts itself to so many uses, your inventory problems are lessened—fewer cables need be carried in stock!

The installations shown above have one thing in common: they're all using Anaconda Durasheath* rubber-insulated neoprene-jacketed power cable —each for a different *kind* of application! Although the above photographs were taken at different installations, they could very well be pictures from one and the same job. Versatile Durasheath is a power cable that can be used to meet almost *any* installation need!

Such versatility in the use of Durasheath enables you to plan the most efficient layout for your wiring – then carry these plans through economically, with assurance of reliability. Talk to the Man from Anaconda about Durasheath. For full information, write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

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PLANT ENGINEERS' DIGEST —so those who rush may read and know what's new

Edited by Marjorie E. Weissman

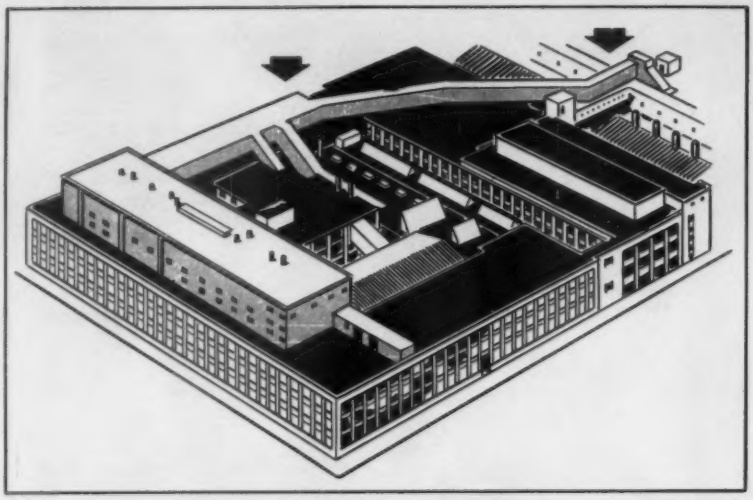
Conveying System for Finishing Parts Traverses Roof and Saves 30,000 Sq Ft of In-Plant Space

EXPANSION VIA the roof at Hamilton Manufacturing Co., Two Rivers, Wis., has gained more than 30,000 sq ft of production space at less cost than remodeling existing operations.

The space was required for a new finishing system for laboratory cabinets, dental equipment, furniture for medical and surgical use, and clothes dryers.

The size and production layout of the company's three-story buildings posed a problem in providing the new finishing system. It was solved by installing a completely self-enclosed system on the roof located above the steel fabricating section, and hooked up by a simple network of conveyor tunnels which pass over the roofs of various buildings. The conveyors dip down into fabricating and assembly areas as needed. The tunnels are extensions of three continuous conveyor lines.

A 27-ft high roof enclosure, measuring 221 ft by 55 ft, houses all the finish-processing equipment, from cleaning and preparation of metal surfaces to the final finish baking.



Roof-top conveyors are part of finishing system that "found" 30,000 sq ft of space.

All three conveyor lines, loaded with parts to be finished, travel to one point in the finishing system and pass parallel in the same direction through a six-stage cleaning and rust-proofing machine; then on through a dry-off oven. From the oven, all lines enter an air conditioned finishing area.

The first line comes through the roof top area loaded with light gage metal parts and travels through two automatic spray booths. From there, it carries the parts through a conventional 30-ft spray booth for the reinforcing coating which is sprayed on manually. The parts then go to the baking oven where the finish is baked at 280 F for 45 minutes; then to assembly.

An unusual feature of this line is that it is designed to loop around a black finish spray booth in such a way that parts, such as kick boards and back panels, can be removed from one side prior to entering the white enamel area, sprayed black and hung on the same conveyor travelling in the opposite direction on the other side. This permits the parts finished in black to complete the finishing cycle, and arrive at assembly on the same conveyor carrying white enameled parts.

The second line carries large formed and welded units and travels parallel to the first line until it enters an 87-ft conventional spray booth.

The third line, which carries parts similar to the second, travels parallel

(Continued on page 44)

Construction Specs Reprint Available

Hot off the press is the 20-page reprint of the five-part article on construction specifications. This article, you will probably recall, appeared in the August through December issues of Plant Engineering. Copies are available at $2.00 each. We will also include a copy of the 16-page "General Conditions" which describe the procedures to be followed in letting all contracts, small or large.

To get your copy or copies fill in the coupon below and mail it to The Editor, Plant Engineering, 308 East James St., Barrington, Ill.

Enclosed is my check for $..... for which please send me.....copies of reprint of "Construction Specifications" at the rate of $2.00 for each copy. Please include a copy of "General Conditions" free of charge.

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For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 42)

to the second line through the cleaning and rust proofing machine and dry-off oven, goes toward the exit tunnel to another part of the plant, for finishing and backing operations on existing equipment integrated into the new system. *From a release of The R. C. Mahon Co., Detroit, Mich.*

Ceramic-Metal Braze

LEAD BRAZE for ceramic-metal seals, useful for working temperatures up to about 300 C, has been developed by Sylvania Electric Products, Inc., New York.

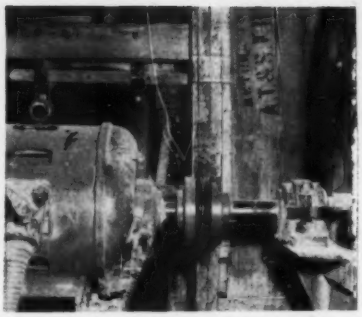
The braze alloy is essentially a lead-copper alloy containing three per cent titanium. Copper improves the fluidity and wetting characteristics of the alloy, and in addition, increases the hardness and mechanical strength. A concentration of seven per cent will sufficiently strengthen it for most applications.

A range of copper contents up to 70 per cent is possible, exhibiting higher melting points and higher hot strengths.

The braze can be used in the form of a powder, sheet or wire. No auxiliary flux is needed to promote the bond, but surfaces must be clean. The assembly is fired at 900 to 1000 C until bonding occurs. Due to the presence of titanium, it is necessary to fire in an atmosphere of dry hydrogen or an inert gas such as argon. The result is a mechanically strong, completely hermetic seal, with a breakdown strength of 300 C. In the majority of cases, this technique lends itself to a one-step operation. *From Lead, published by Lead Industries Assoc., New York, N. Y.*

Flexible Coupling Eliminates Machine Vibration

THE PROBLEM of connecting the unequally-sized shafts of a hammer mill and a 60-hp electric motor was solved at the Ardmore Milling Co., Ardmore, Okla., by installing a flexible coupling designed to compensate for angular and parallel misalignment and end-float. The hammer mill was originally direct connected with the electric motor which operates at 3600 rpm. The motor shaft is ⅞-in. diam, the mill shaft, 2-7/16-in. diam. Vibration was so great that the motor had to be rewound twice within two years' time. In operation, the bearings on the motor and on the mill would become so hot within less than an hour's running time, that the mill would have to be shut down to cool off the bearings.



Use of flexible coupling between hammer mill and electric motor eliminates both vibration and overheated bearings.

The new coupling was taken from stock and bored to fit the motor

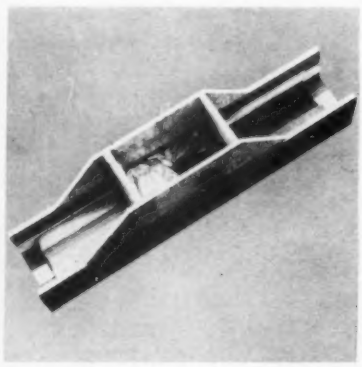
(Continued on page 46)

Navy Finds Simple, Easy Way To Cut Insulation and Apply Adhesive Cement

CUTTING AND INSTALLATION of a new type of foam glass insulation for steam lines has been simplified at the United States Shipyards at Pearl Harbor.

The insulation used to be cut by hand saw, but the material is so hard that the saw blades were dulled after a day's use. Now, a piece of steel wire, looped above a table top and attached to a foot pedal under the table is used, eliminating the tedious task of hand cutting.

The adhesive cement, which used to be applied with trowels and wooden paddles, is now applied to the insulation with a shop-made device—a 3-ft long wooden box, with a center compartment that is filled with the cement. The insulation is pushed through the bottom of the box from one end and emerges at the opposite end of the box ready for installation. *From Bureau of Ships Journal, published by Navy Department, Bureau of Ships, Washington, D. C.*



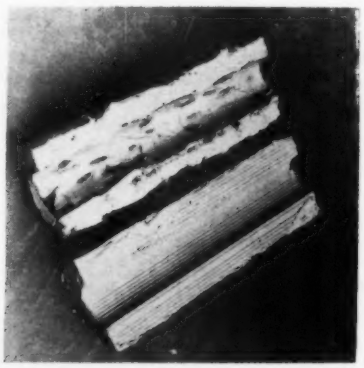


Table and steel wire loop for cutting insulation are shown in photograph, left. Box for applying cement (center). Photograph at right shows cement applied by trowel (left) and cement applied with new applicator (right).

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SMOOTH WELDS, remove rivets faster with B & D Sander-Grinder and B & D Saucer or Depressed Center Wheels.

REMOVE PAINT, SCALE, RUST; clean castings or tanks with B & D Wire Cup Brushes and Sander-Grinder.

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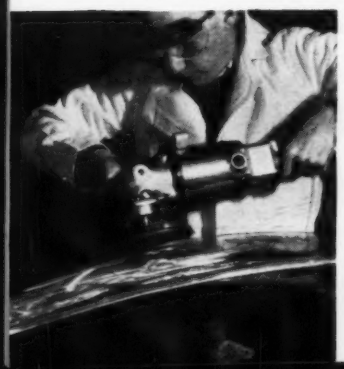
LOOK FOR SWIFTY SERVICE at one of B & D'S 47 Factory Service Branches. There's one near you.



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PLANT ENGINEERS' DIGEST

(Digest begins on page 42)

and mill shafts. It consists of two flanges connected by a two-piece flexible rubber sleeve. The teeth of the sleeve halves lock into the teeth of the flanges, tightening under torque to provide smooth transmission power. There are no clamps or screws.

Since this coupling was installed, vibration has been almost eliminated, and the motor and mill bearings run cool. *From a release of T. B. Wood's Sons Co., Chambersburg, Pa.*

Multi-Level Worker

Special adaptor permits fork truck to lower load 7 ft into quench tank below floor level at Empire Steel Castings, Reading, Pa. (From a release of Towmotor Corporation, Cleveland, Ohio.)

Tunnel Gets New Face

A PEDESTRIAN TUNNEL in the Borough of Manhattan, N. Y., which had become discolored and eroded after more than 50 years of use, was rehabilitated by painting it with an epoxy resin-based, white pigmented finish. The system was formulated for maximum visibility and reflectance.

The coating, which gives tile-like protection to the tunnel walls, consists of a two-part system containing a curing agent and the pigmented epoxy resin-based component. The two parts are mixed just prior to application which can be made by spray, roller or brush.

The only pretreatment necessary

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⅛" and ¼" pipe sizes

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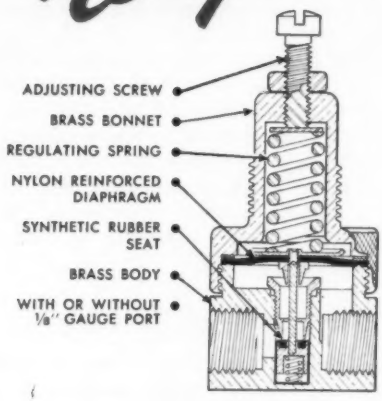

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Compact

The small size of this regulator — only 3 1/32" high, with 1⅜" hex body diameter (without gauge) — makes it ideal for installations where space is tight.

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PLANT ENGINEERS' DIGEST

(Digest begins on page 42)

Epoxy resin-based coating is applied with roller to wall. Below, finish provides good visibility and reflectance.

in the tunnel was a thorough sand blasting of the 30,000-sq ft surface. The finish cures by chemical reaction within 24 to 36 hours, depending on the temperature. The only maintenance required will be periodic washing with soap and water. *From a release of CIBA Products Corp., New York, N. Y.*

Machines Tagged for Safety

WHEN A MACHINE is moved from one department to another in a plant, a part such as a guard for a gear box could be misplaced. Or a new machine may not meet company safety standards at the time of installation.

To prevent injury in either case, a machine tag system has been found very effective at Wagner Electric Corporation, St. Louis, Mo., according to O. J. Pickel, Supervisor, Safety and Medical Service.

The machine tag measures three

Now's the time to prevent freezing of heater coils... with Production Planned steam trapping

By John W. Ritter, Test Engineer, SARCO Company, Inc.

Freezing of heating coils usually takes place when outside air temperature is slightly below the freezing point, and it is most common in coils that have the steam supply controlled by a temperature regulator which keeps the outlet air temperature constant. Freezing can occur only when the coil becomes water-logged, and in this case the steam trap is often blamed for the trouble.

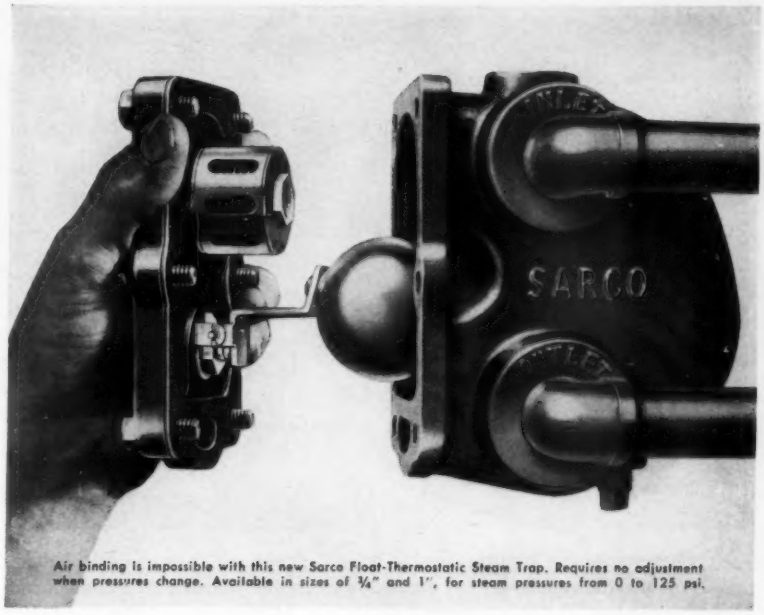
The discharge capacity of any steam trap depends upon the difference in pressure between the trap inlet and its outlet. If there is no pressure difference, the trap cannot remove condensate; and if inlet pressure is lower than outlet pressure, condensate will be held back in the coil.

There are three ways to avoid this difficulty. First, a pressure controlled bypass can be arranged around the temperature control valve to prevent heater pressure from falling below a preset minimum. This plan would make the temperature controller ineffective over part of the range of outside air temperature.

A better solution is to install the steam trap well below the unit, and thus provide a hydraulic leg to enable the trap to discharge even with a vacuum in the steam space. An ample sized vacuum breaker should be installed at the top of the steam inlet of the heater.

To compute the hydraulic head needed, use a figure of 3′ per 1 psi pressure differential. For example, if the trap has the required capacity at 1 psi differential, the minimum head will be 3′.

Thirdly, on new construction, the preheater can be divided into two sections. The first should be capable of raising the air to at least 32° under minimum outside air conditions. The second section should raise the air from 32° to the final temperature. Full steam is supplied to the first coil at all times, while the second is controlled to maintain the final temperature needed. The first coil will not freeze because of the maintained pressure, nor will the second, because minimum air temperature is always above 32°.



Air binding is impossible with this new Sarco Float-Thermostatic Steam Trap. Requires no adjustment when pressures change. Available in sizes of ¾" and 1", for steam pressures from 0 to 125 psi.

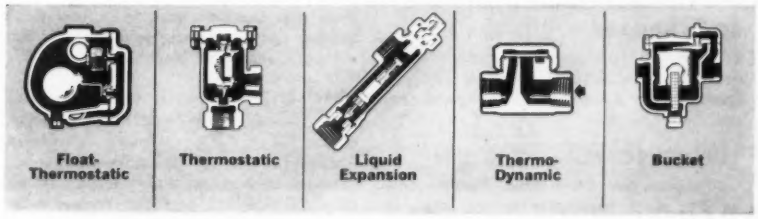
A SARCO F-T Steam Trap will drain condensate completely

Count on the Sarco Float-Thermostatic Steam Trap to discharge condensate practically at steam temperature, continuously and without shock. Sarco F-T's do not cause pressure fluctuation while discharging.

For *production planned* trapping of heating coils, with accurate temperature control, use the new Sarco Steam Trap Type F-T.

Write for Technical Bulletin T502 on prevention of freezing in heater coils. You'll also receive a bulletin on Sarco F-T Steam Traps.

Remember that Sarco can give you *impartial* advice on steam trapping because only Sarco makes all 5 types. 5968-B



SARCO
COMPANY, INC.
635 Madison Ave., New York 22, N. Y.

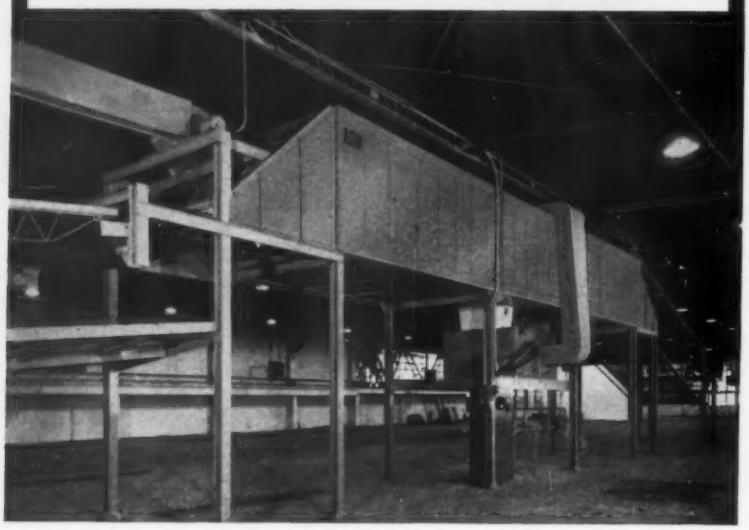
Only Sarco makes all 5 types:
Thermostatic • Liquid Expansion • Float Thermostatic
Thermo-Dynamic • Bucket

STEAM TRAPS • TEMPERATURE CONTROLLERS • STRAINERS • HEATING SPECIALTIES

For more facts circle 535 on Reply Card

SLY INDUSTRIAL OVENS

Heavy Duty for All Needs



Sly Ovens insure better results, greater overall economy through efficient air distribution . . . close temperature control . . . maximum heat utilization . . . time-saving materials handling . . . space-saving installation. Like the "A" type oven pictured, all Sly Ovens are expertly designed and sturdily constructed to meet the particular job requirements. A complete line of conveyorized and batch types for all applications to 800° F.

See SLY for Savings Down the Line

DUST CONTROL SYSTEMS
Unequaled experience in system design plus the most extensive dust filter line. *Dynaclone* and *Automatic-Continuous* for uninterrupted, 24-hour-a-day service. *Intermittent* for non-continuous applications. Plus "*Unit*" and "*Economy*" filters.

INDUSTRIAL OVENS
Conveyorized and batch type for better results and increased savings on all baking, drying, finishing, and aging applications.

ROD BAKERS
Pit type in complete range of sizes. Reduce drying time of lime-coated rods from 30 minutes to 5. Designed to save space and coil handling time.

TUMBLING MILLS
Continuous and batch type. Remove fins as they clean castings — saving hours of machining.

BLAST ROOMS
In all types and sizes, with full mechanical return of abrasives. Thoroughly ventilated. Built to withstand years of heavy use.

PURAIR HELMETS
Complete protection against even the finest dust. Lightweight, comfortable. Maximum visibility, complete freedom of head movement.

UNIFLO NOZZLES
Steel with tungsten carbide orifice lining outlasts hard iron nozzles 200 to 1. For shot, grit and sand blasting.

PLUS . . .
Wear-resistant "Slyblast" hose. "Purair" blower units. Air pressure regulators. Abrasive elevating and cleaning units. Pressure blast tanks. Blast cabinets. Tilted blast mills. Gloves, aprons, canvas suits, leggings.

SINCE 1870 SLY

SEND FOR CATALOG describing complete line.

THE W. W. SLY MANUFACTURING CO.

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OVERSEAS LICENSEE: ANDREW AIR CONDITIONING LTD., LONDON S.W. 1, ENGLAND

For more facts circle 536 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 42)

inches by six inches and is in two parts. The top part reads, "Do not operate unless approved by foreman and safety department." Both parts have an identification number.

Usually the electrical department performs the final step in preparing a machine for production. The electrician, upon completing the job, tags the machine control switch.

The lower portion of the tag is completed by the electricians, by his giving the machine number; location, including building, floor, section and bay; signature and date.

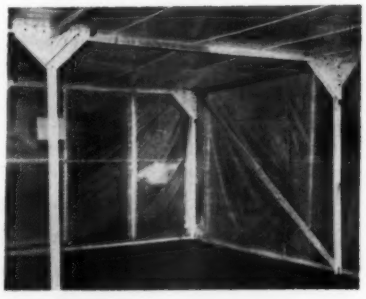
This bottom portion of the tag is removed and forwarded to the safety department. The safety inspector and foreman then inspect the machine and either release it for production or make necessary recommendations.

If the machine is released, the top portion of the tag is removed and disposed of, the lower portion is signed and dated by the foreman and safety inspector and is filed. If the machine is not approved, the top part of the tag remains on the machine and arrangements are made to complete the release of the machine. *From Safety News Letter, Automotive & Machine Shop Section, published by National Safety Council, Chicago, Ill.*

Dehumidified Storage

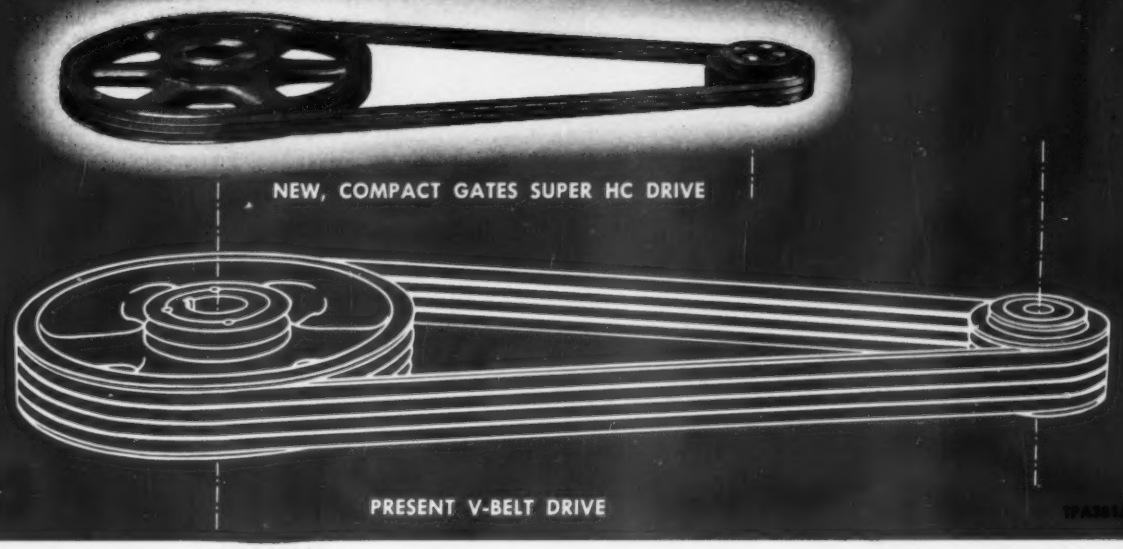
HUTMENTS MADE of polyethylene film are being used by the Martin Co., Baltimore, Md., to provide storage space that can be dehumidified.

Each hutment covers a floor area



Inside view of polyethylene hutment used for moisture-free storage in plant.

New high capacity V-belt revolutionizes drive design



Makes drives far more compact... cuts cost as much as 20%

Here is a major advance in the field of power transmission — the fully proved Gates Super HC V-Belt, developed in the world's largest belt-testing laboratories at The Gates Rubber Company.

The Gates Super HC V-Belt makes possible the lowest-cost, lightest-weight, most compact multiple V-belt drive that can be put on any machine! Sheave diameters can be reduced up to 50%, sheave widths 30% to 50%, center distances 20% and more.

On new drives, the cost of a Gates Super HC V-Belt Drive is as much as 20% less than present V-belt drives of the same horsepower capacity.

Learn more about the cost-saving Super HC Drive

For detailed information on the Super HC Drive, contact your nearby Gates distributor or Gates Office for new booklet, *"The Modern Way to Design Multiple V-Belt Drives."*

For utmost space, weight and dollar savings in new drives or drive replacements, specify Gates Super HC V-Belts and Sheaves. Stocks immediately available in principal industrial centers.

How savings multiply with Gates Super HC V-Belt Drive

Cost of a new Gates Super HC V-Belt Drive is as much as 20% less than cost of a drive of comparable horsepower using present V-belts. In addition to the lower cost of the drive itself, further economies are realized on housings and bases — economies in materials, production time, shipping costs.

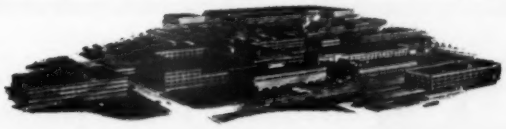
Shown below are space savings of a typical installation...

	DriveR Sheave Diam.	DriveN Sheave Diam.	Center Distance	No. of belts
Present Drive	7.4"	20.0"	42.9"	4
Super HC Drive	5.3"	14.0"	30.0"	3

The Gates Rubber Company, Denver, Colorado • Gates Rubber of Canada Ltd., Brantford, Ontario

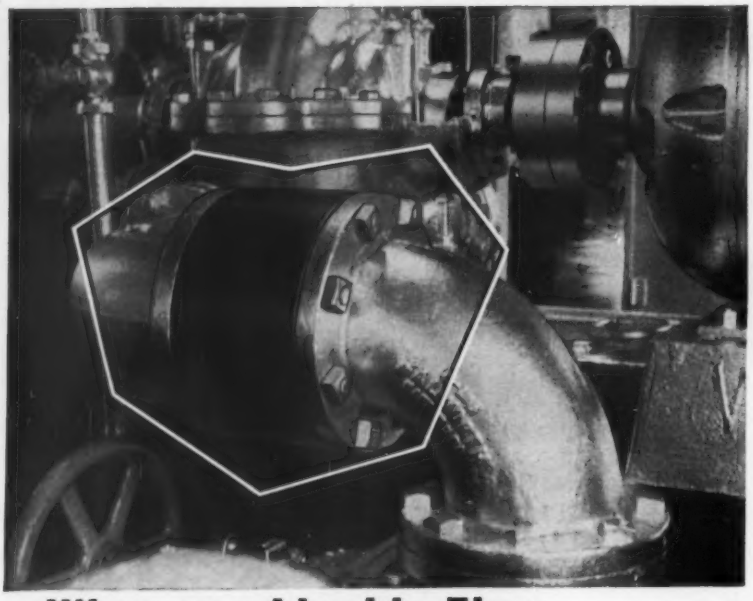
Gates

World's Largest Maker of V-Belts



Gates Super HC V-Belt Drives

For more facts circle 537 on Reply Card



Wherever Liquids Flow, Use Silent . . . Non-Slam

CPV CHECK VALVES

★ Spring actuated, CPV Check Valves close automatically and silently as soon as flow ceases.
★ Positively eliminate back-drop, surge and hammer in any piping system due to reverse flow.
★ Available for *all* pressures and temperatures—including high temperature hot water.
★ Disc is straight guided with two-point bearing—any possibility of tilting or leakage is eliminated.
★ Easily installed in any position.
★ Full radial flow area minimizes head loss.
★ Approved by Factory Mutual Laboratories.

COMPLETE RANGE OF SIZES AND TYPES
To Meet Your Requirements—Exactly

STYLE "H"—½"–2"

STYLE "G"—2"–10"

STYLE "NU"—½"–2"

STYLE "GB"—6"–18" or more

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SOLD BY RELIABLE AGENTS IN PRINCIPAL CITIES

For more facts circle 538 on Reply Card

PLANT ENGINEERS' DIGEST

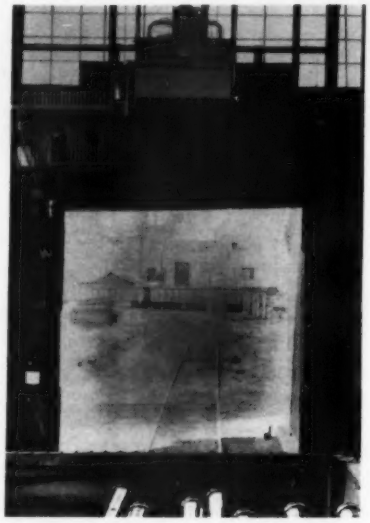
(Digest begins on page 42)

of approximately 3200 sq ft. The polyethylene is supported by columns. Air-supported hutments were considered, but the amount of traffic in to and out of the enclosures made that method impractical.

Eight enclosures, providing a total volume of about 235,000 cu ft, are used by the Martin Co. *From a release of Plastics Div., Visking Co., Div. of Union Carbide Corp., Chicago, Ill*

It's Warm Inside

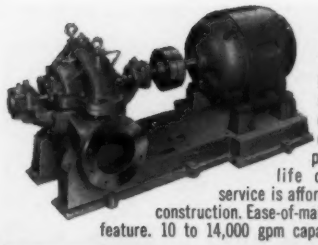
DURING COLD weather, large doors opened frequently for freight car or truck movements allow masses of wintry air to enter and cause uncomfortable and hazardous



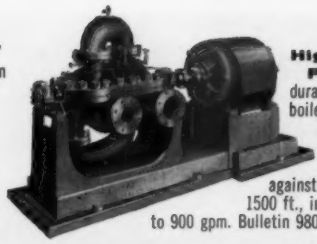
Thermostatically controlled, automatically operated overhead door heater keeps exit warm in cold weather.

working conditions. The Spang-Chalfant Division of the National Supply Co., Etna, Pa. solved this problem in its shipping department by mounting an overhead door heater over the freight doors.

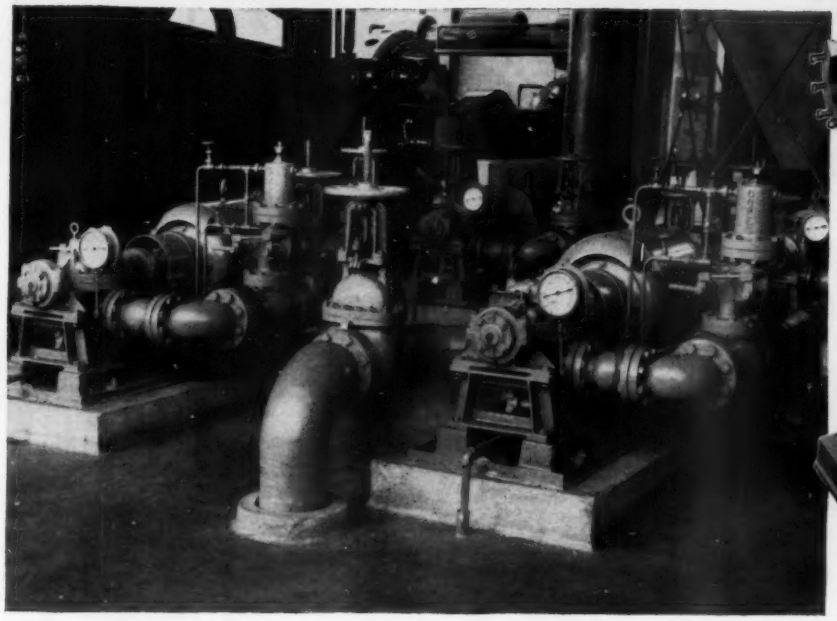
The heater is electrically connected to the door so that the heater operates automatically when the door is opened, filtering warm air through the entering cold air. It is thermostatically controlled when the door is shut. *From a release of L. J. Wing Mfg. Co., Linden, N. J.*

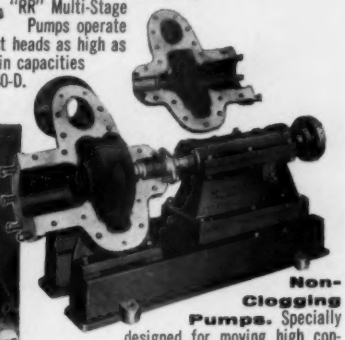


Clear Water Pumps. "Buffalo" Type "SL" Double Suction Pumps are designed for peak efficiency in clear water applications. A long life of economical service is afforded by their rugged construction. Ease-of-maintenance is a built-in feature. 10 to 14,000 gpm capacities. Bulletin 955-R.

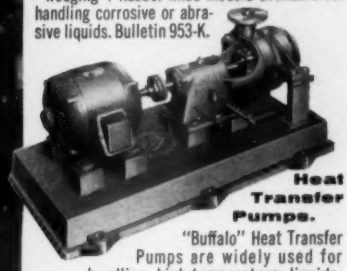


High Pressure Pumps. Offering efficiency, durability and dependability for boiler feed water and other clear water service, "Buffalo" Type "RR" Multi-Stage Pumps operate against heads as high as 1500 ft., in capacities to 900 gpm. Bulletin 980-D.



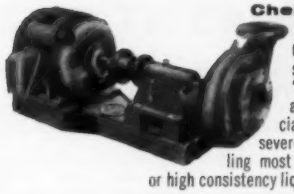


Non-Clogging Pumps. Specially designed for moving high consistency liquids, "Buffalo" Diagonally Split-Shell Pumps reduce down time, wear and "wedging". Rubber-lined models available for handling corrosive or abrasive liquids. Bulletin 953-K.



Heat Transfer Pumps. "Buffalo" Heat Transfer Pumps are widely used for handling high-temperature liquids. Ruggedly-built with special alloys, they utilize water-cooled bearings and packing. Efficient, single-suction, solid shell design. Write for application information.

PUMPING EFFICIENCY TAILORED TO YOUR NEEDS



Chemical Liquid Pumps. Choose from 10 special types of "Buffalo" Pumps in a variety of trim. Specially engineered for severe service in handling most corrosive, abrasive or high consistency liquids. Bulletin 982-A.

What are your liquid moving needs? Chances are, you'll find the right pump for your job from the complete "Buffalo" line.

You can rely on "Buffalo" Pumps to perform with maximum efficiency and dependability. Their rugged construction insures a long life of maintenance-free operation. Economy, too, is a big factor. For example, interchangeability of parts is designed into "Buffalo" Pumps through standardization. This saves you valuable dollars in lower parts inventories.

Add to these advantages the helpful services of the "Buffalo" engineering team, and you have every reason to choose "Buffalo" Pumps for your particular needs. This engineering know-how is backed by more than 80 years of broad experience in solving liquid moving problems.

Whatever your pumping needs, call in your nearby "Buffalo" representative. He'll be glad to help you select the pump best-suited to your job. Or write us direct for full information and bulletins.

"Buffalo" Pumps bring you the "Q" Factor — the built-in QUALITY that provides trouble-free satisfaction and long life.

"Buffalo" PUMPS

BUFFALO PUMPS

Division of Buffalo Forge Co.

166 MORTIMER ST. • BUFFALO, N. Y.

Canada Pumps, Ltd., Kitchener, Ont. • Sales Representatives in all Principal Cities

A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID

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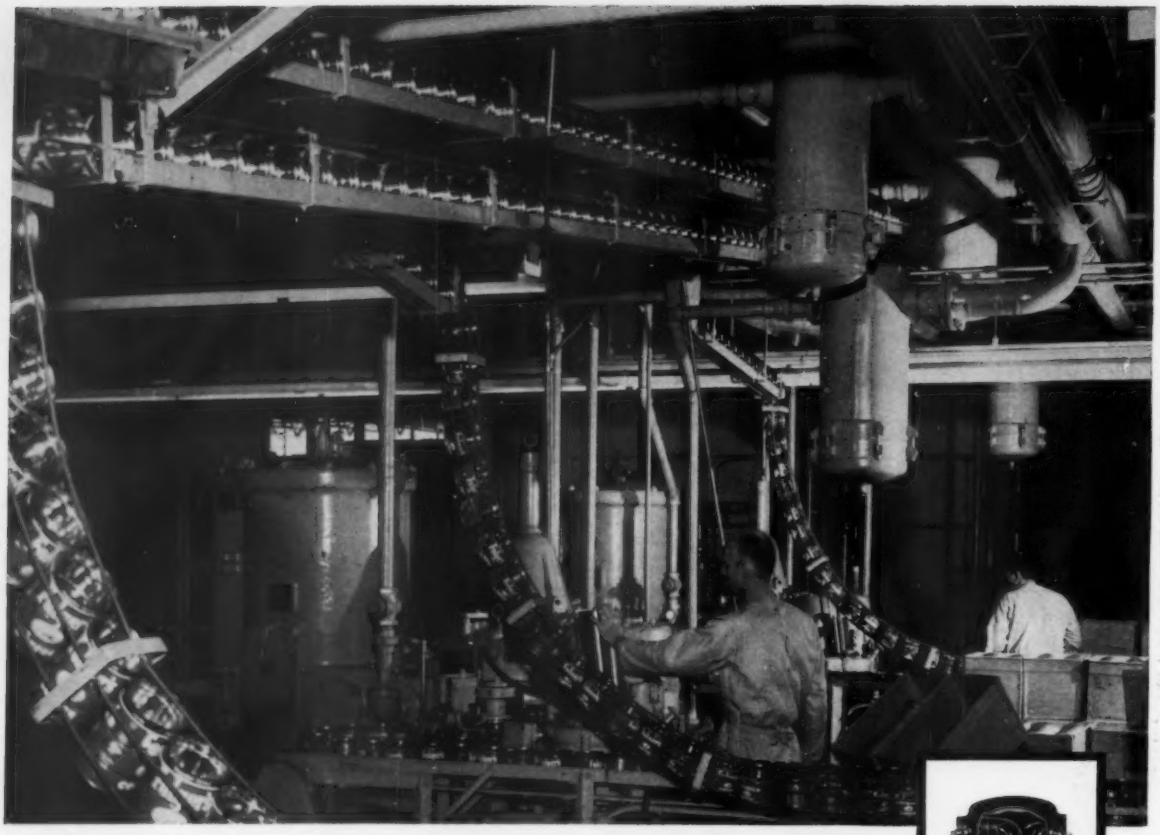
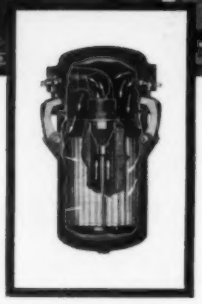


STAYNEW FILTERS KEEP TROUBLE FROM BREWING AT FOLGER'S COFFEE PLANT

At Folger's multi-million dollar plant in Los Angeles, Staynew Pipeline Filters play a vital role in vacuum packing—in fact, they literally keep trouble from brewing.

In vacuum packing shutdowns for pump repair cannot be tolerated. Pumps "suck" air from coffee cans before they are sealed for shipment. When this air is drawn off, some coffee particles are bound to come with it. At Folger's, Staynew Filters protect the vacuum pumps by preventing these particles from getting to them. Located between the production line and the pumps, Staynew Filters first mechanically clean the incoming air by forcing heavier particles into the base of the housing. Then, flowing through the Radial Fin Filtering Insert, any remaining airborne materials are removed, leaving only clean air to pass to the pump. Mechanical separation before filtering reduces the load on the filtering element. Low velocity with unusually low resistance to flow results. This keeps line pressures at the proper operating level and offers a tremendous saving in horsepower.

Designed to eliminate frequent cleaning, Staynew Filters contain a liberal space in the bottom housing for large particle accumulation — this can be drained off without shutdown. The Radial Fin construction of the filtering element provides an extremely big active filtering area—this means a greater amount of filtering over a longer period of time. For inspection and cleaning, large swing bolts permit removal of the lower housing, offering easy access to the filter interior without breaking pipe connections.



Model CVH Staynew Filter used at Folger's. Filter inserts consist of Feltex 12 wool felt, are cleaned only once weekly.

Assuring sustained, trouble-free operation of pumps at high load factors, Staynew Pipeline Filters have been successful in the packing of millions of pounds of coffee annually at Folger's. They've also gained wide acceptance in the processing of canned meat and other foods, and on vacuum degassing and high vacuum metal processing systems, to name a few. There's a Staynew Filter for every job—find out how you can save time and money on your particular application—consult a Dollinger representative, or write for Bulletin 200. Dollinger Corporation, 55 Centre Park, Rochester 3, N. Y.

REG. PROTECTOMOTOR U.S. PAT. OFF.

STAYNEW FILTERS

DOLLINGER

SPECIALIZING IN DRY TYPE FILTERS FOR OVER 35 YEARS

LIQUID FILTERS • PIPE LINE FILTERS • INTAKE FILTERS • HYDRAULIC FILTERS • ELECTROSTATIC FILTERS • MIST COLLECTORS • DRY PANEL FILTERS • SPECIAL DESIGN FILTERS • VISCOUS PANEL FILTERS • LOW PRESSURE FILTERS HIGH PRESSURE FILTERS • AUTOMATIC VENTILATION FILTERS • NATURAL GAS FILTERS • SILENCER FILTERS

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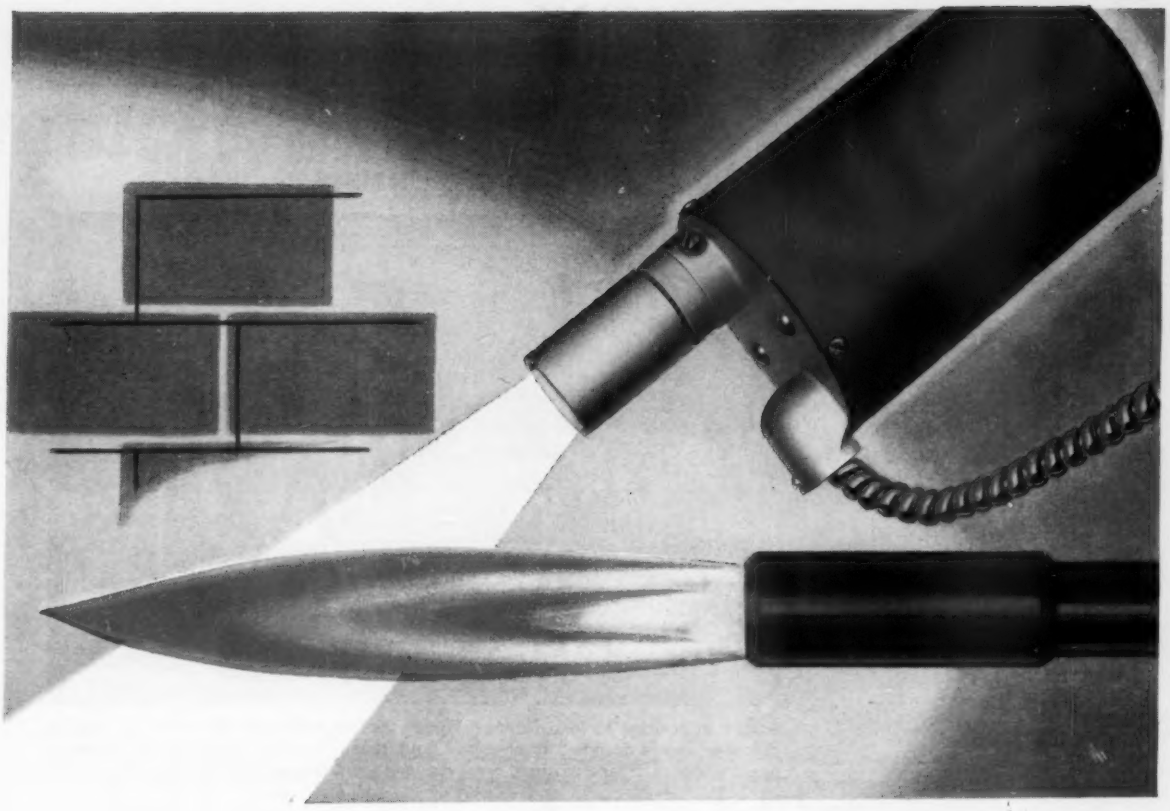


New Honeywell Flame Detector

not fooled by hot refractory or glowing carbon...

The ultimate in both safety and convenience, *Ultra-Vision Flame Detector responds *only* to ultraviolet—not to infrared**

Here's the *only* visual flame detector that can tell the difference between real flame and red-hot refractory or glowing carbon. It responds to nothing but the ultraviolet energy given off by flame and sparks, and can't be fooled. It cuts off fuel delivery on flame failure alone, and completely eliminates nuisance shutdowns.

Use the new *Ultra-Vision* Flame Detector to supervise gas-fired, oil-fired or oil-gas burners—it detects a flame from any type of fuel. This one unit keeps an eye on both the pilot and main flame. Use it with any standard rectification-type flame safeguard system, such as the *Protectoglo*. The *Ultra-Vision* sensor is easy to install, because it is insensitive to the refractory, and can be aimed at the flame from any convenient direction.

Now, for the first time, it's possible to have positive flame protection where protection formerly was difficult or impossible—in radiant cup burners and gas generators used to produce atomospheres for heat treating furnaces, for example.

Get complete details from your nearby Honeywell field engineer. Call him today... he's as near as your phone. Or write for Bulletin 95-2776.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

*Trademark

Honeywell

H HONEYWELL *First in Control*

OPERATION AND PRODUCTION —pointers for the industrial plant engineer

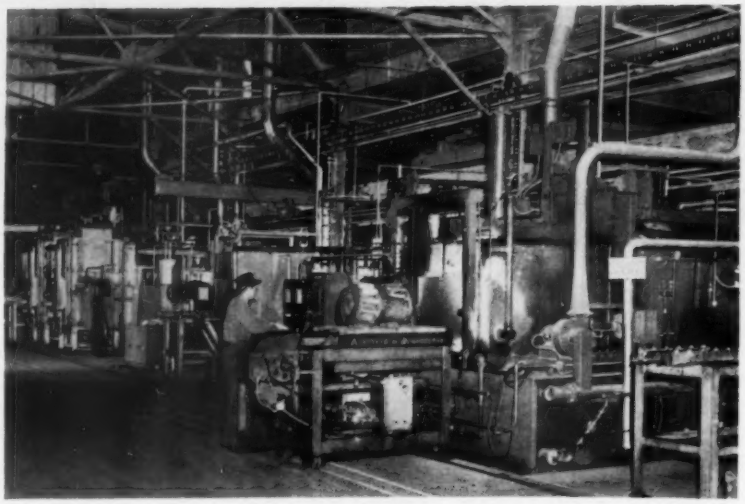
Edited by Vern Kempf

Straight Line Setup, Motorized Transfer Buggy Automates Heat-Treating Department

INDIVIDUAL parts weighing hundreds of pounds, or work loads of similar magnitude are being treated in a straight line setup of batch-type furnaces at the Harnischfeger Corporation, Milwaukee, Wisconsin.

One man operates all of the heat-treating facilities by means of a shuttle-buggy which rolls on two floor rails installed the full length of the heat-treating line. Trays are loaded at a work station by the operator and automatically move on to the buggy as required. The operator rides on the running board of the loaded buggy which conveys the load to the furnace.

After the furnace door is opened, a transfer chain on the buggy charges the tray load of parts into the furnace, furnished by the Surface Combustion Corporation, Toledo, Ohio. All the operations from this point are completely automatic. Transfer to heating chamber, temperature, time at temperature, removal for quench and positioning for removal from the furnace itself are all performed without any attention on the part of the operator.



Buggy in position to load furnace. Upper portion of furnace functions as cooling chamber and is designed to conserve floor space. Load is cooled to 700 F before opening doors. Transfer chain removes load from furnace and places it on buggy.

Upon completion of the cycle, the transfer chain removes the load from the furnace and places it on the shuttle-buggy to be transported to the spray washer. After removal of excess quenching oil, the trays are moved to a holding rack. Here the parts are permitted to cool further for completion of metallurgical transformation. Surface inspection and hardness checks are performed at this point.

Plant Wall Opens So Crane Can Roll Outside

OPENING or closing in one and one-half minutes, a new roll-up wall system has solved a material handling problem at the Composite Forge Company, Detroit, Mich.

Using steel rolling door sections, one of them 42 ft high, the system was worked out by engineers of the R. C. Mahon Company. Two pushbuttons are used to send the four doors out of sight in compact rolls near the ceiling.

End wall of plant with all doors closed. Loading is done through center door.

With doors open and lifted, traveling crane can travel out of the building.

Since the tall door is arranged to operate independently for routine uses, it is controlled entirely by one of the pushbuttons. The other pushbutton enables the remaining three doors to operate together.

When all four doors roll up, the hinged posts or mullions flanking each side of the rolling sections automatically rise toward the ceiling. All sections of the motorized roll-up wall are interlocked so they cannot be operated while the mullions are out of position. In the

(Continued on page 58)

quickest TO ERECT

quickest TO INSTALL

quickest TO RE-ARRANGE

quickest TO PAY FOR ITSELF

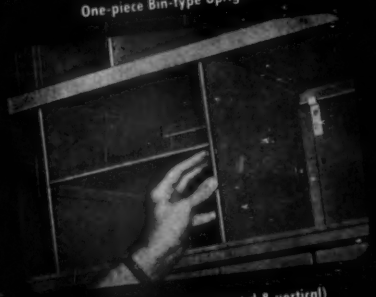
DELUXE STEEL SHELVING

quickest BECAUSE...

Patented Boltless Shelf Bracket

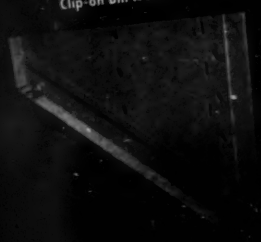
Factory Built-in Shelf Reinforcing

One-piece Bin-type Upright



Snap-in Dividers (horizontal & vertical)

Clip-on Bin Fronts



Bottom Shelf Support and Floor Angle

. . . you realized that a shipment of knockdown shelving parts has no useful value. It must first be assembled into shelving racks for storage utility. The faster these racks are erected, the lower your installation cost. So, because Deluxe steel shelving is erected the quickest, your *installed cost* is the lowest.

The film strip shows 6 engineering features of Deluxe steel shelving that promote quickest erection. Take the patented Deluxe boltless shelf bracket . . . it replaces 90% of the time-consuming nuts and bolts and allows not only quickest installation, but easy shelf adjustment.

THE PROOF: At 1958 trade shows, two untrained girls erected a complete closed section of Deluxe Boltless Steel Shelving in *less than 5 minutes.*

Call your local Deluxe dealer or write for the new, complete Deluxe Shelving Catalog No. 30.

DELUXE

DELUXE METAL FURNITURE COMPANY · Warren 7, Pa.

A Division of the Royal Metal Manufacturing Company

For more facts circle 542 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)

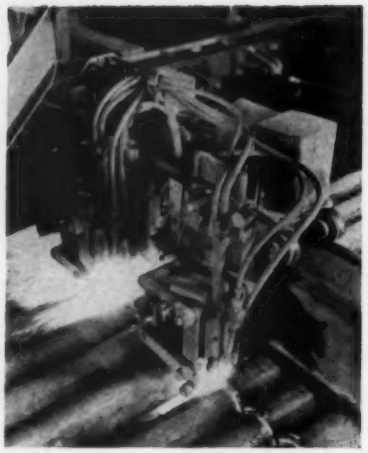
closing sequence the mullions are lowered and then finally pushed into position by air cylinders.

Powder Speeds Flame-Cutting

IRON POWDER added to an oxygen cutting flame gets cuts off to a flying start in a highly effective flame-cutting machine used to cut steel billets at the Pittsburgh Steel Company, Allenport, Pa. Billets 3½ to 7½ in. in diameter are sliced into lengths ranging from 4 to 12 ft.

Materials cut vary from mild steel, through tough high carbon, to 4 to 6 per cent chrome alloy steel. Cuts are made fast, clean and require no finishing. After the billets are cut, they are fed into seamless hot tube mills to be made into tubing.

Service engineers of Linde Company, division of Union Carbide Corporation, cooperated with Pittsburgh Steel in the design and construction of the automatic cutting machine. Two cutting torches with power cutting attachments are mounted on a machine carriage that automatically controls the cutting speed. Cams riding on the surface of the billets raise and lower the torches to follow the round surfaces.



Iron powder speeds production cutting of billets in this flame-cutting machine.

Iron powder is fed into the oxygen cutting stream from a pneumatic dispenser. The addition of powder produces the intense reaction that gets cuts on the round surface started. Use of the powder also allows the operator to quickly pick up the cut if for any reason the machine should be stopped at any point in its cycle.

Brushes Improve Shaft Welding

Contributed by Lloyd McWilliams

WORN SHAFTS are frequently repaired by setting them up between centers of improvised lathes and rotating them slowly while building up the surface by arc-welding methods. The welder ground is usually attached to the frame of the machine with the result that heavy welding currents pass through the machine bearings. With this arrangement the machine bearings are soon damaged beyond repair and the quality of welding is lowered due to the poor ground connection.

To overcome this problem, three spare brush-holders were mounted on a bracket and arranged so that the brushes were in contact with the rotating shaft. The arc-welder ground lead is connected to the

(Continued on page 60)

Open Washrooms Promote Cleanliness, Reduce Cost

Contributed by Kenneth F. Biddle, Plant Engineer, Sundstrand Aviation, Rockford, Illinois

HERE ARE two examples of open washrooms that we have found encourage cleanliness and are more economical because of the elimination of walls. In Fig. 1, wash basins and towel racks are placed just outside the toilet area. This move permitted the installation of additional water closets in the enclosed area.

Another method we used is the semi-enclosed area shown in Fig. 2. Here Unistrut framing is used to support plywood panels on which the mirrors and towel racks are mounted. Vertical framing members are mounted on four-foot centers with the two-foot plywood panels mounted horizontally 56 in. above the floor level. Costs for this construction run about $18.00 to $20.00 for each four-foot section.

Fig. 1. Open washroom design releases space in the enclosed area for the installation of additional toilet facilities.

Fig. 2. Partial plywood screen around this open washroom provides space for the installation of mirrors and towel racks.

For more facts circle 543 on Reply Card ——→

Gets 40% savings in coolant costs by change to

Standard's Transparent Coolant

ARGON Oil No. 4

Chicago Saws, Inc., realizes other benefits in switch to this Standard Oil product

Situation: It all started when a Standard Oil lubrication specialist recommended ARGON Oil No. 4, Standard's transparent coolant to Chicago Saws for use in their grinding operations. This manufacturer of rotary saw blades decided to give it a try. They knew the product was the result of more than three years' work in Standard's research laboratory, and that it had been extensively field tested.

What happened: Using ARGON Oil No. 4 in 100:1 concentration, Chicago Saws was able to reduce coolant costs 40%. They also found the work could be seen more clearly when using this coolant. There was less wheel loading. They also discovered the coolant didn't foam and that its exceptional ability to carry off heat resulted in cooler operation. Faster cuts were obtained with finer wheels. Tolerances were easier to hold. Better finishes were obtained. Less frequent wheel dressings were required.

What you can do: Get more information about ARGON Oil No. 4 transparent coolant. Call the Standard Oil lubrication specialist near you in any of the 15 Midwest or Rocky Mountain states. Or write: **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Using ARGON Oil No. 4, Chicago Saws gets better finish at savings of 40% over other coolants tried. Operator is using .004" cut on heat treated Rockwell 60 C steel.

You expect more from STANDARD *and you get it!*

Standard's Bob Stark and Chicago Saws' vice president Paul Bostrom discuss blades and coolants. Bob Stark is well qualified to work with manufacturers on the use of metalworking coolants. Bob has a chemistry degree from Illinois College plus three years' experience at Standard. He has completed the Standard Oil Sales Engineering School course.

Quick facts about

Standard's Transparent Coolant

ARGON Oil No. 4

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- All chemical. Does not support bacteria growth
- Unaffected by humidity
- Nonfoaming
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For more facts circle 544 on Reply Card

OPERATION— PRODUCTION

(O and P begins on page 56)

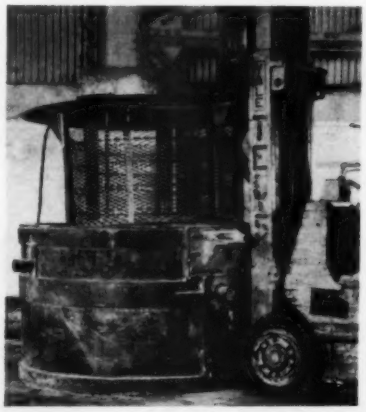
Brush-holders provide effective ground return for the heavy welding currents.

brush-holders and provides an effective return path for the welding current. The improved electrical characteristics have raised the quality of the welds and damage to the lathe bearings has been minimized by this simple device.

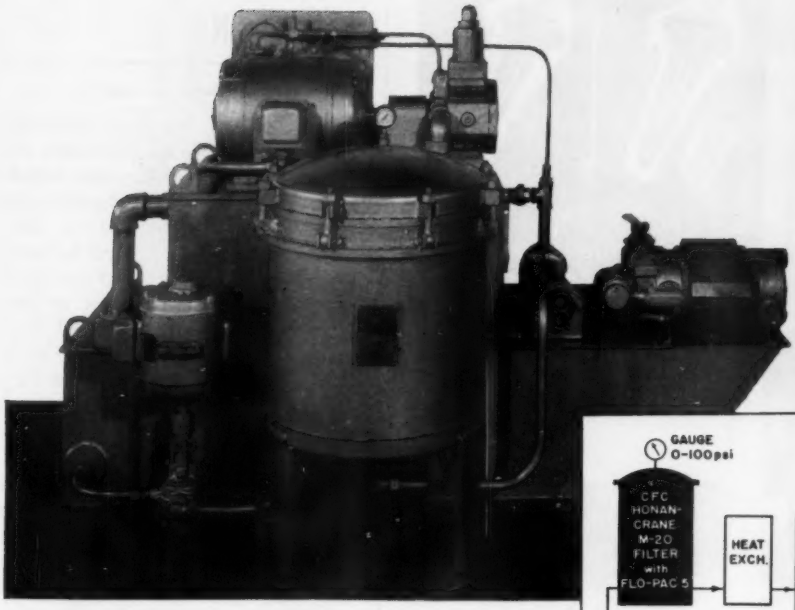
Preheat Reduces Thermal Shock

ELECTRIC HEATERS are used to preheat aluminum tapping pots at the Canadian British Aluminum Company, Limited, Quebec, Canada. This is done to prevent thermal shock from the molten aluminum and resultant damage to linings used in the tapping pots.

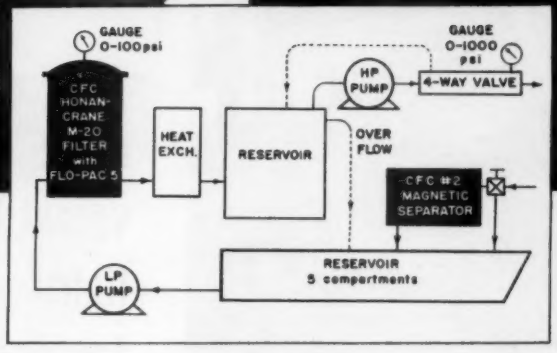
The assembly consists of eight half-circle Chromalox electric tubular heating elements manufactured



Lowering heating unit into tapping pot. Preheating extends life of pot linings.



This installation, designed and built for a leading electrical manufacturer by Hydro Air Engineering, Inc., St. Louis, Missouri, supplies mineral oil coolant, 90 SUS, at 600 PSI, to target drill. CFC Magnetic Separator removes ferrous contaminants. Oil then passes through compartmented reservoir to provide sedimentation of remaining particles. CFC Honan-Crane Filter then acts as polishing filter to take out contaminants not already removed.



"ON-TARGET" FOR REDUCED COSTS

Hydro Air Engineering, Inc. unit cuts downtime with CFC Honan-Crane Filters and Magnetic Separators

This Hydro Air Engineering, Inc. Unit assures reduced costs on target drill operation by keeping coolants micro-clean with CFC Magnetic Separator and CFC Honan-Crane Filter. Drill has extremely heavy chip load. By maintaining continuous supply of *clean* oil, CFC equipment protects the high pressure pump and valves, and prevents clogging of the drill ports. This means lower costs through reduced downtime, less tool breakage, and fewer rejects.

The low-cost CFC Magnetic Separator, with permanent Alnico magnets, removes ferrous chips automatically and continuously. It is compact, light-weight, easy to install. Unit includes totally enclosed gearhead motor. No separate pump is required.

The CFC Honan-Crane Filter employs the new Flo Pac 5 Cartridge — designed to remove 98% of all particles larger than 5 micron. Tough, resin-impregnated paper provides more than 6300 square inches of filtering surface, per cartridge.

For technical literature, or engineering assistance, write to Department PG

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For more facts circle 545 on Reply Card

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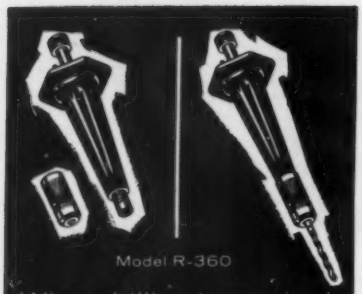
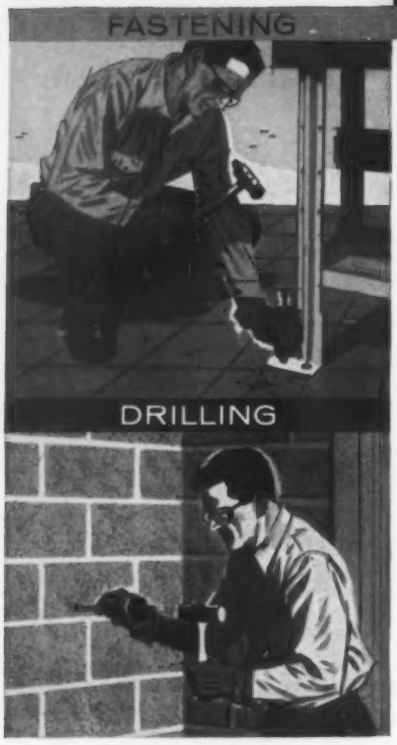


Model R-360

When drilling is required, simple adapter converts tool for use as drill



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For more facts circle 546 on Reply Card

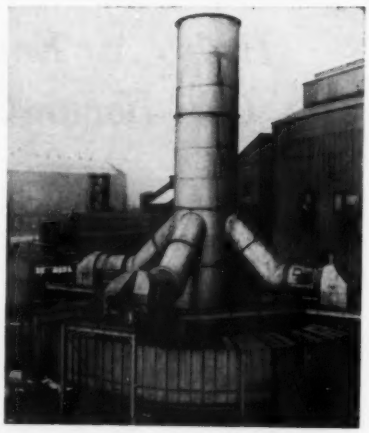
OPERATION—PRODUCTION

(O and P begins on page 56)

by the Edwin L. Wiegand Company, Pittsburgh, Pa. Heating elements are attached to vertical supports which are welded to a one-quarter-inch-thick, round steel cover plate. Elements are properly spaced for uniform heat distribution and the cover plate confines the heat for greater efficiency and lowers the heat loss. Heater ends are formed to enter two vertical boxes from where they go to a terminal box on the cover.

Expanded metal is mounted on an angle-iron framework surrounding the heating elements to serve as a protective screen. A ring is welded to the steel cover plate to permit pickup by fork-lift truck or crane. Rating of each assembly is 15 kw and the units operate on 575 volts. Heat exposure time is manually controlled.

Air Cooler Lowers Water Use



Designed to cool hot sinter from 1300 F to 200 F in less than 30 minutes, this air cooler has been installed at Cleveland Works of Jones & Laughlin Steel Corporation. Built by Dravo Corporation, cooler utilizes 450,000 cfm of air to bring about sharp temperature reduction and eliminates the use of water for cooling, a process that is still used in many plants today.

Carbon Lining Increases Blast Furnace Capacity

INSTALLATION of some 45,000 carbon bricks at the Great Lakes Steel Corporation, Division of Na-

This dollar-saving **Solid Wedge Gate**

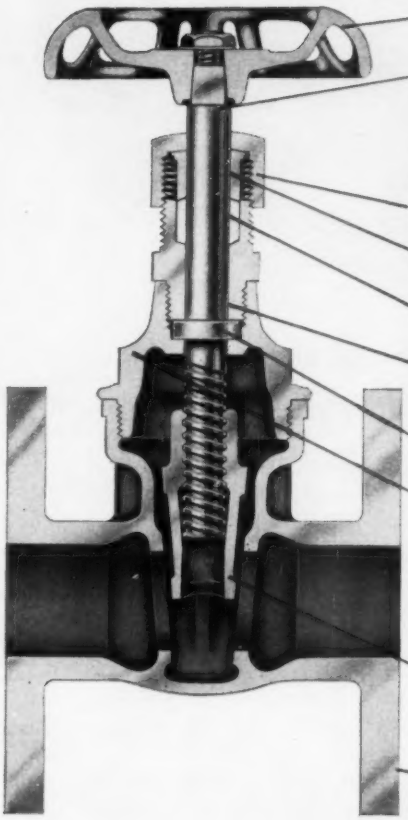
shows it pays to

Specify JENKINS for STAINLESS STEEL Valves, too

BECAUSE Jenkins puts an extra-measure of quality in this Fig. 1300 Solid Wedge, Inside Screw Gate Valve you will find it satisfies the needs of many services for which a more costly type often would be used. Look at the many superiorities in design and construction shown here. You'll conclude that it's hard to beat Jenkins at making valves, no matter what the material.

But no picture can show the quality of the castings . . . the precision machining . . . the rigid inspection and testing that have gone into this valve. All of these are as important as design and metal alloys in assuring long, dependable, economical valve service. And, all of them are up to the peak standards for which Jenkins has been known for almost a century.

SEND FOR NEW CATALOG of Jenkins Stainless Steel Valves, in patterns and alloys that satisfy the requirements of practically all corrosive services. These Jenkins Valves meet valve industry specifications and the high standards established by leading users of stainless steel valves.



WHEEL of high strength malleable iron, designed for firm, cool grip and easy operation.

SPINDLE of large diameter and dense structure has high resistance to wear and torsion strains. The threads precisely machined to correct pitch and lead assure tightness, ease of operation and resistance to shearing stresses.

PACKING NUT is strong and deep for full thread engagement.

PACKING GLAND is a self-centering design to afford tightness without excessive friction on spindle.

PACKING — A Teflon ring in a large capacity box requires less frequent replacement.

PACKING BOX NIPPLE assumes thrust when closing valve. It is extra heavy, with hex flats larger than diameter of bonnet face to prevent leakage.

SPINDLE COLLAR, integral with spindle, is large and wide to resist thrust and shearing strains.

BONNET is a rugged unit, with accurately machined threads to assure tight joints with the body and packing box nipple. Top of wedge and corresponding face inside of bonnet are machined to insure perfect spindle alignment and backseating for repacking valve under pressure.

SOLID WEDGE is tapered equally on both faces. Lugs on sides of wedge engage guide ribs in body to reduce drag and minimize chatter.

BODY has best combination of wall thickness and shell design to withstand pipeline stresses. An integral seat minimizes corrosive attacks.

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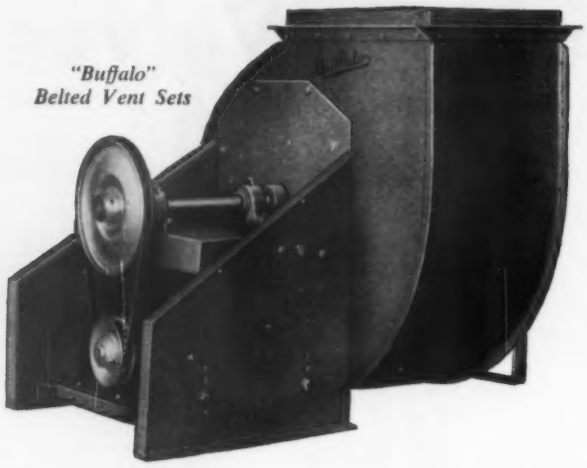

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For more facts circle 548 on Reply Card

OPERATION—PRODUCTION

(O & P begins on page 56)

tional Steel Corporation, Detroit, Michigan, marks the first use of a new grade of carbon brick especially suited to furnace linings.

Weighing nearly 700,000 pounds, the carbon lining increases the hearth diameter from the 28 ft possible with a previously-used ceramic lining to 29½ ft. This increase in diameter results in greater capacity for the production of pig iron.

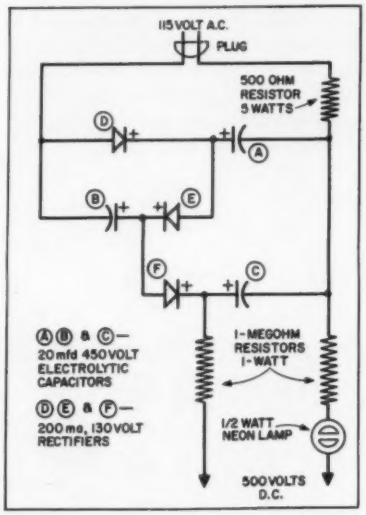
Bricks manufactured by National Carbon Company, Division of Union Carbide Corporation are used to form a hearthwall ranging in thickness from 27 in. to 15 in.

This is the third furnace operated by the Great Lakes Steel Corporation to have a carbon lining. Successful experience with carbon as a refractory material prompted Great Lakes Steel Corporation to choose the new grade in an attempt to get the longest possible campaign with one lining and a resultant minimum hot-metal cost.

Tester Spots Faulty Insulation

Contributed by H. Josephs, Plant Maintenance Department, Sun Shipbuilding Corporation, Chester, Pa.

TESTING starters, generator windings and wires suspected of having poor insulation resistance is accomplished simply and inexpensively with a portable tester constructed



Voltage tripler circuit provides high voltage d-c for testing wire insulation.

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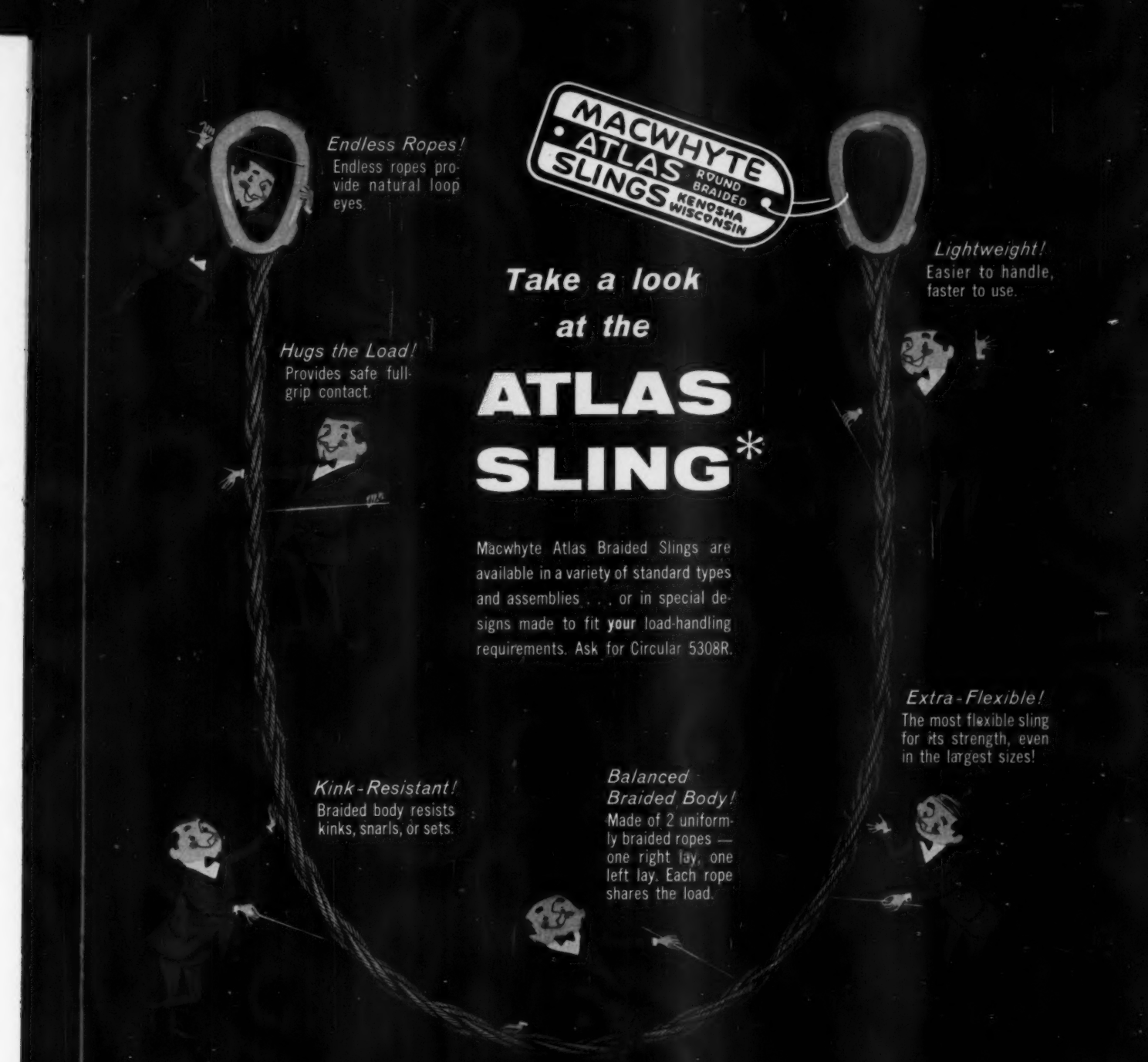
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Made of 2 uniformly braided ropes — one right lay, one left lay. Each rope shares the load.

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Photograph shows "Smoke Box Room" with its window glazed with clear glass.

Smoke Box photo showing window glazed with a diffusing glass.

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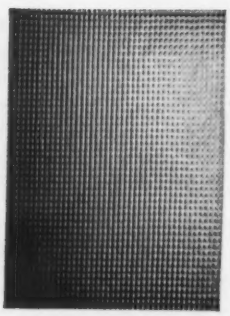

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For more facts circle 550 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)

from radio parts. The unit plugs into any 115v a-c receptacle and delivers 500v direct current to the test probes.

Half-wave rectifiers are used in a voltage tripler circuit to provide the test voltage. Three 200 ma, 130v rectifiers are connected in series and three 20 mfd, 450v electrolytic capacitors are used as blocking condensors. A one-megohm series resistor connected into each test lead limits the test current to a safe value to prevent fatal shocks.

Used as an indicator, a one-half watt neon lamp is inserted in one test lead to show the condition of the insulation under test. If the insulation is grounded, the lamp will glow at full intensity. Higher insulation resistance causes the bulb to glow dim.

How Much Does It Weigh?

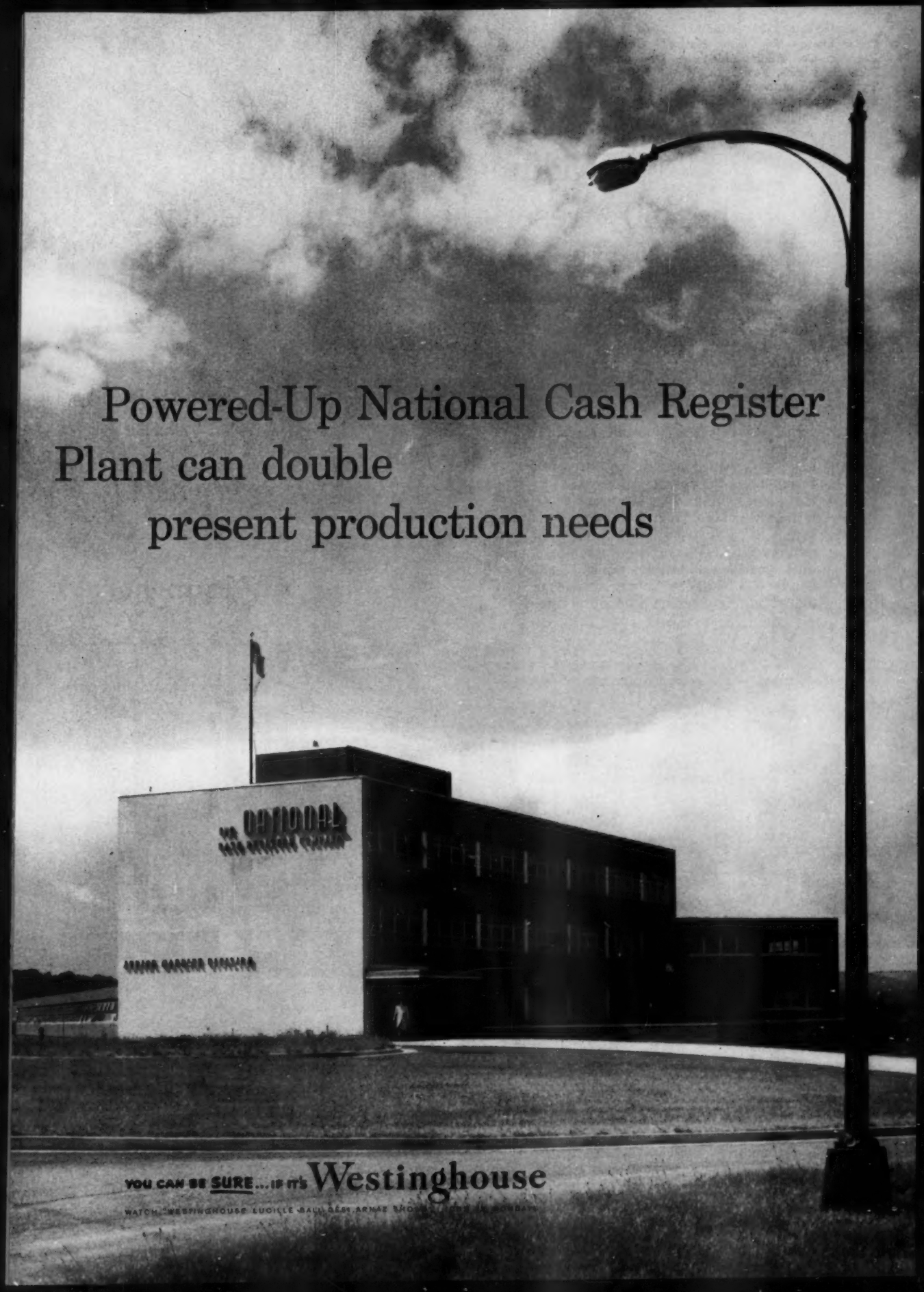
Contributed by M. Stolberg, Mfg. Engr., Westinghouse Electric Corporation, Pittsburgh, Pa.

ONE of the first items to consider when lifting, setting or moving heavy plant equipment is weight. This can be computed by finding the area and thickness of the various components and using weights per cubic foot of various steels and castings.

A simpler method is to convert the pressure in the hydraulic jacks used for lifting into pounds. This is done by connecting pressure gages, with appropriate scales, to the pressure cylinders of the hydraulic jacks. The lift is made, making sure that the equipment is clear of bearings, foundations and other supports and the jacks are carrying the full weight.

Take the reading on the pressure gage on each of the jacks used. In each case, divide the reading in pounds per square inch by the area of the ram in square inches to change the reading to pounds. The total number of pounds equals the weight of the equipment.

A multiplier, indicating the area of the ram in square inches, can be painted on each jack to simplify conversion of the gage reading to pounds.


Powered-Up National Cash Register
Plant can double
present production needs
YOU CAN BE SURE... IF IT'S Westinghouse

Cover photo — Top: New National Cash Register Co. Adding Machine Division Plant, in Ithaca, New York. Westinghouse Type OV-20 outdoor lighting is used for the building approach and parking area.

New adding machine plant has 50% reserve electrical capacity

When the Ithaca, N. Y., Adding Machine Division of The National Cash Register Co. found its existing plant inadequate, a new plant site was secured. The design and planning for the new plant provided more efficient production methods and future plant expansion as required.

Once space requirements were satisfied, electrical power needs were detailed. An all-Westinghouse electrical distribution system was specified to meet these needs. A 2000/2300-kva, double-ended power center, located near the middle of the manufacturing area, feeds ten runs of plug-in bus duct which distribute low-voltage power throughout the plant. Six runs of 600-amp, three-pole plug-in duct are used for 480-v distribution, while four runs of 600-amp, four-pole duct supply 277 wye/480 v for both lighting and power requirements. Use of Westinghouse plug-in bus duct provides a flexible, efficient system which can be easily adapted to any changes in the automated adding machine production line.

The new Ithaca plant has 50% more electrical capacity than is required by present production needs. The new 146-acre site (as compared to the previous six acres) is ample for anticipated space requirements, while the electrical system capacity can be doubled simply by utilizing the provisions for expansion and the spare equipment now installed. An interesting example of the new plant's expansion possibilities is that the present plant structure can be extended 600 more feet to the back. The location of the installed power centers will allow any necessary new feeders to be installed with minimum distance and voltage drop. In some cases, present bus duct runs can be extended into the new area.

Westinghouse worked closely with the architect, consulting engineer, general contractor, electrical

(continued)

YOU CAN BE SURE...IF IT'S Westinghouse

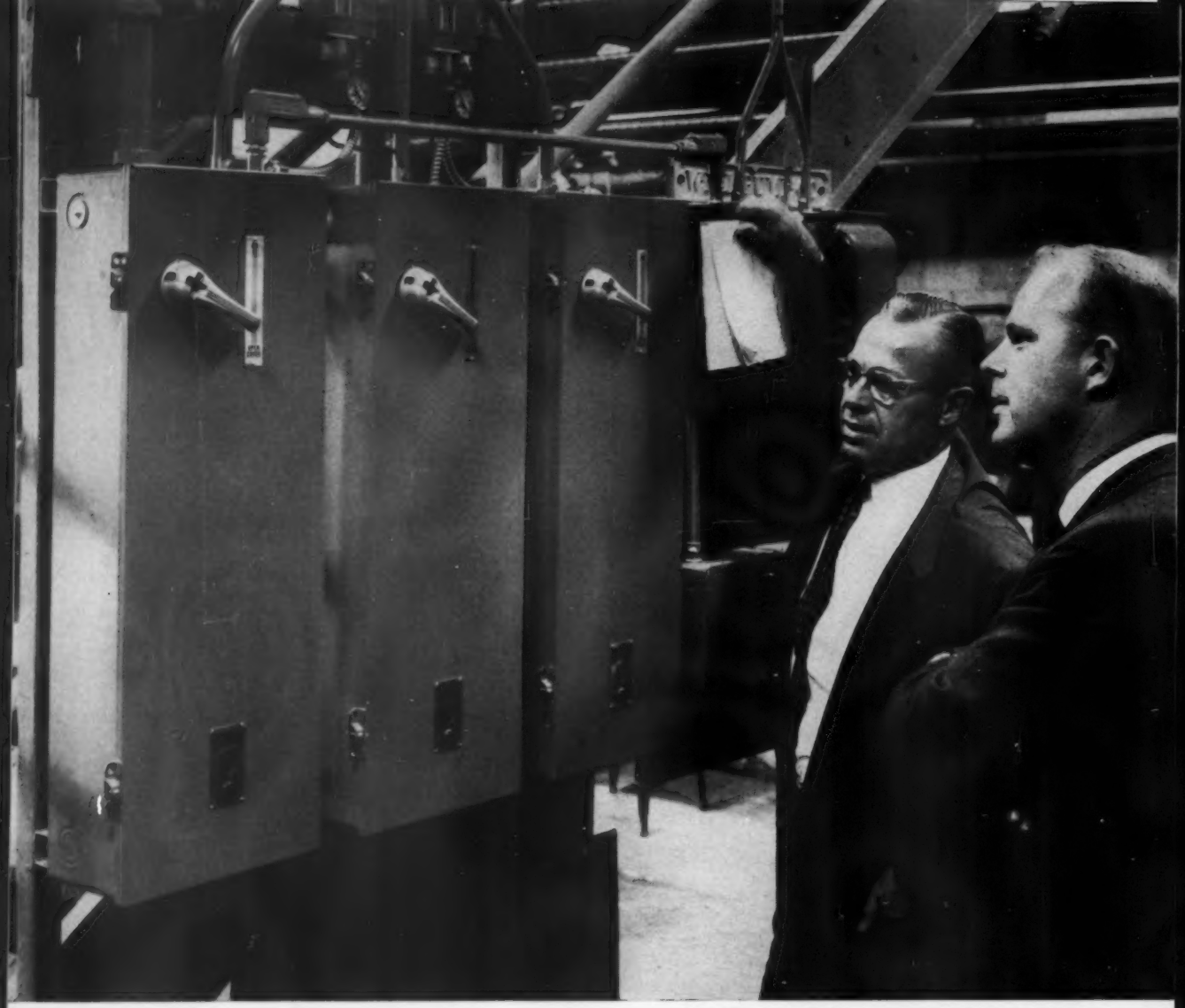
Conference room discussion includes Charles T. Hansen, Westinghouse Sales Engineer; John M. Schweiger, Schweiger, Heapy & Associates, Consulting Engineers; James Miller, Westinghouse Construction Sales Engineer; Clair Dean, Buffalo Electric Co., Electrical Contractors and Westinghouse Distributor; Ed Likens, Professional Engineer, Lorenz & Williams, Architects and Engineers; and C. W. Vail, Plant Engineer, Adding Machine Division of The National Cash Register Co., Ithaca, N. Y.

J. Victor Bagnardi, Ithaca representative of Lorenz & Williams, and John M. Schweiger are shown in electrical equipment room. On wall facing them can be seen four Westinghouse panelboards and a Westinghouse 50-kva, 480-v primary to 120/240-v secondary, single-phase, DS-3, dry-type transformer. Two of the panelboards are NLAB 120/240v, one is a NHIB 277/480v, and the opened panelboard in the foreground is a CDP 277/480v. J-94087-2

General plant view shows multiple runs of Westinghouse 2WVO-40R, 277-v fluorescent lighting and 600-amp copper plug-in bus duct. Plug-in units shown are circuit breaker type. Plug-in bus duct and circuit breaker plug-in units are standard requirements in The National Cash Register manufacturing plants.

Clair Dean, John Schweiger and C. W. Vail discuss details of Westinghouse 2000-kva, double-ended (one 1000-kva Inerteen® transformer each end) power center. Incoming voltage of 4800 is reduced to 480 wye/277. Each transformer has provision for 150 additional kva, so only fans need to be added when increased rating is needed. Four spare DB breakers are installed in board to take care of future load and, in addition, four cells are equipped to receive breakers when needed. (Note new switchgear design with three-position DB circuit breakers. Visible positioning tells at a glance if breaker is in "ON," "TEST" or "OFF" position. New "TEST" position allows testing of breaker in switchgear cell with complete safety.)

J-94087-3



Clair Dean and Charles Hansen examine three Westinghouse Class 11-204 nonreversing combination Life-Line® starters which provide control and overload protection for the motors in the equipment room.

50% reserve electrical capacity *(continued)*

contractor and The National Cash Register Co. engineers in selecting the equipment which provides for present and future electrical needs. Westinghouse can also help you with any of your electrical planning and construction requirements. See your Westinghouse distributor, or write: Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

J-94087-4

Owner: The National Cash Register Co., Dayton, Ohio

Architect: Lorenz & Williams, Architects and Engineers, Dayton, Ohio

Consulting Engineer: Schweiger, Heapy & Associates, Dayton, Ohio

General Contractor: Streeter Associates, Inc., Elmira, N. Y.

Electrical Contractor: Buffalo Electric Co., Inc., Buffalo, N. Y.

Westinghouse Distributor: Buffalo Electric Co., Inc., Buffalo, N. Y.

YOU CAN BE SURE...IF IT'S **Westinghouse**

WATCH "WESTINGHOUSE LUCILLE BALL DESI ARNAZ SHOWS" CBS TV MONDAYS

Over 200 Pages Westinghouse Data in Sweet's Construction File. (S)

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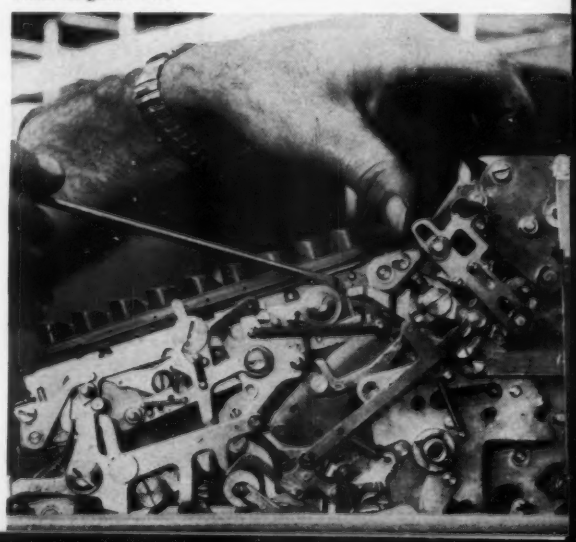
Close-up view of adding machine mechanism as manufactured in Adding Machine Division of The National Cash Register Co.



Good bet: You're paying for lubricants you don't need

Does this case sound familiar to you?

A midwest firm was buying lubricants on the recommendation of every department head, foreman or even operator. Inventory — often duplicated — was scattered all over the plant, yet shortages in one spot were never related to overstocks in another. The result: costly overstocking, extra handling, increased dangers of misapplication.

Management then instituted an Organized Lubrication Plan. Now they use 20 lubes instead of 97, have cut their purchase orders from 300 to 12 per year. Direct savings are estimated at thousands of dollars annually.

Can Organized Lubrication save money in your plant? Contact your local Texaco Engineer or write for "Management Practices that Control Costs via Organized Lubrication." The Texas Company, 135 East 42nd Street, New York 17, N. Y., Dept. E-81.

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

TUNE IN . . . Metropolitan Opera
Radio BROADCASTS
every Saturday afternoon

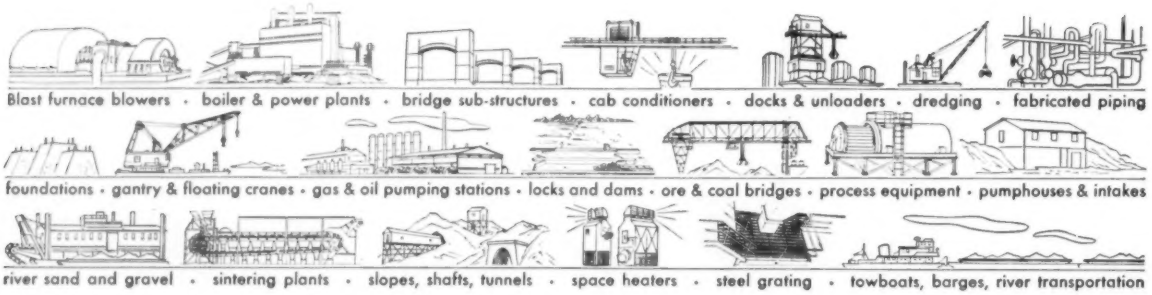
Big warehouse keeps warm with four heaters

This 79,000 square foot warehouse of the C. A. Turner Company, Rankin, Pa., has high roof areas and large access doors. Yet, only four Dravo *Counterflo* heaters were needed to maintain a 68° comfort level during last January's severe cold spell with its frequent sub-zero temperatures. Fuel costs for the month were 7/10¢ per square foot!

More than 20,000 Dravo heaters, in use throughout the world, provide this same low cost heating in manufacturing plants, schools, commercial and public buildings. A factory-trained organization handles service on 24-hour call.

Are you paying for inadequate, obsolete or inefficient heating? A Dravo engineer will evaluate your present system now at no obligation. For information on this, or any of the other services and products pictured below, write DRAVO CORPORATION, PITTSBURGH 25, PENNSYLVANIA.

DRAVO
CORPORATION



Blast furnace blowers · boiler & power plants · bridge sub-structures · cab conditioners · docks & unloaders · dredging · fabricated piping

foundations · gantry & floating cranes · gas & oil pumping stations · locks and dams · ore & coal bridges · process equipment · pumphouses & intakes

river sand and gravel · sintering plants · slopes, shafts, tunnels · space heaters · steel grating · towboats, barges, river transportation

For more facts circle 553 on Reply Card

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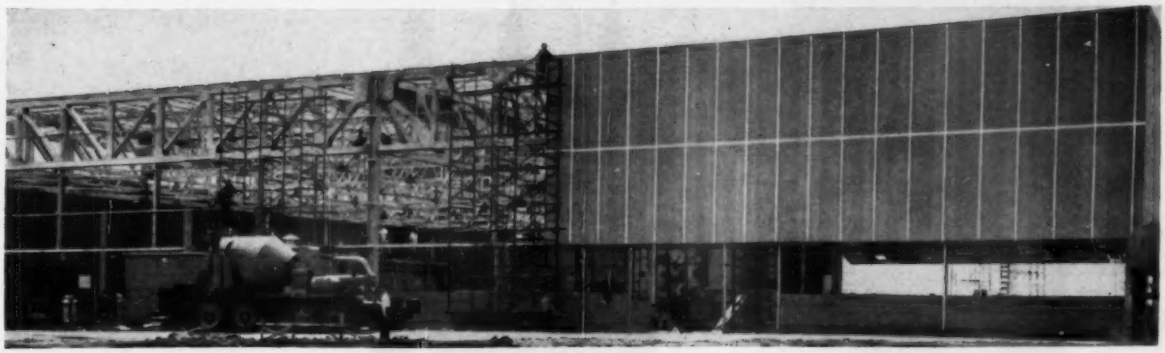
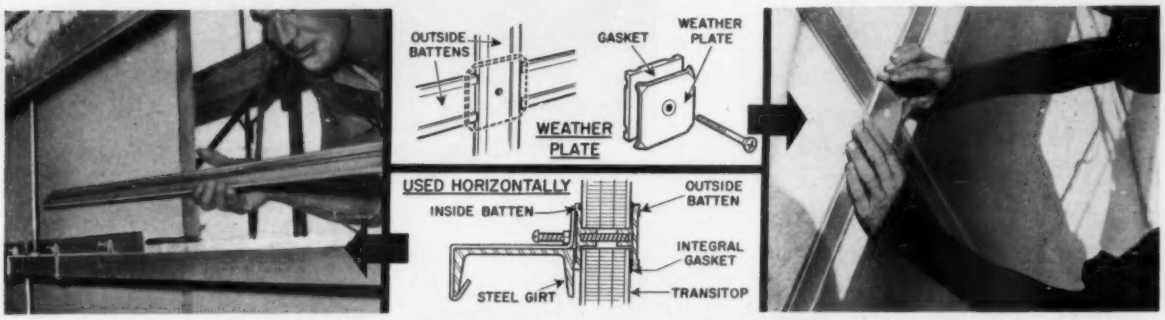
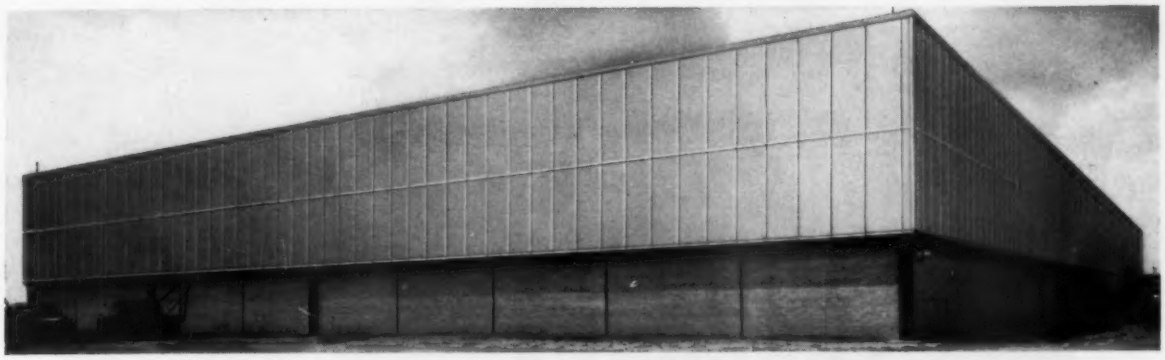
Johns-Manville ASBESTOS TRANSITOP® Panels provide swift, economical, weathertight curtain wall construction



Transitop panels are big . . . 4′ wide x 8′ to 12′ high . . . finish large areas fast . . . structurally strong yet light in weight . . . thicknesses from 11/16″ to 2″. Panels consist of an insulating core with an asbestos facing on both sides.



H & B Aluminum Battens and Accessories provide neat horizontal and vertical joints that . . . simplify wall erection . . . adjust in three dimensions . . . withstand weather, vibration, wind load and thermal change.



Transitop panels are an attractive stone gray in appearance. Pre-primed panels also available for any type of paint finish if color is desired. Using H & B Aluminum Battens, panels can be demounted and reused when constructing building additions.

SEND FOR ILLUSTRATED BROCHURE

See for yourself how J-M Transitop structural panels can be used for economical construction of exterior or interior walls and roof decks. Write Johns-Manville, Box 158, New York 16, N. Y. In Canada, Port Credit, Ont.

JOHNS-MANVILLE

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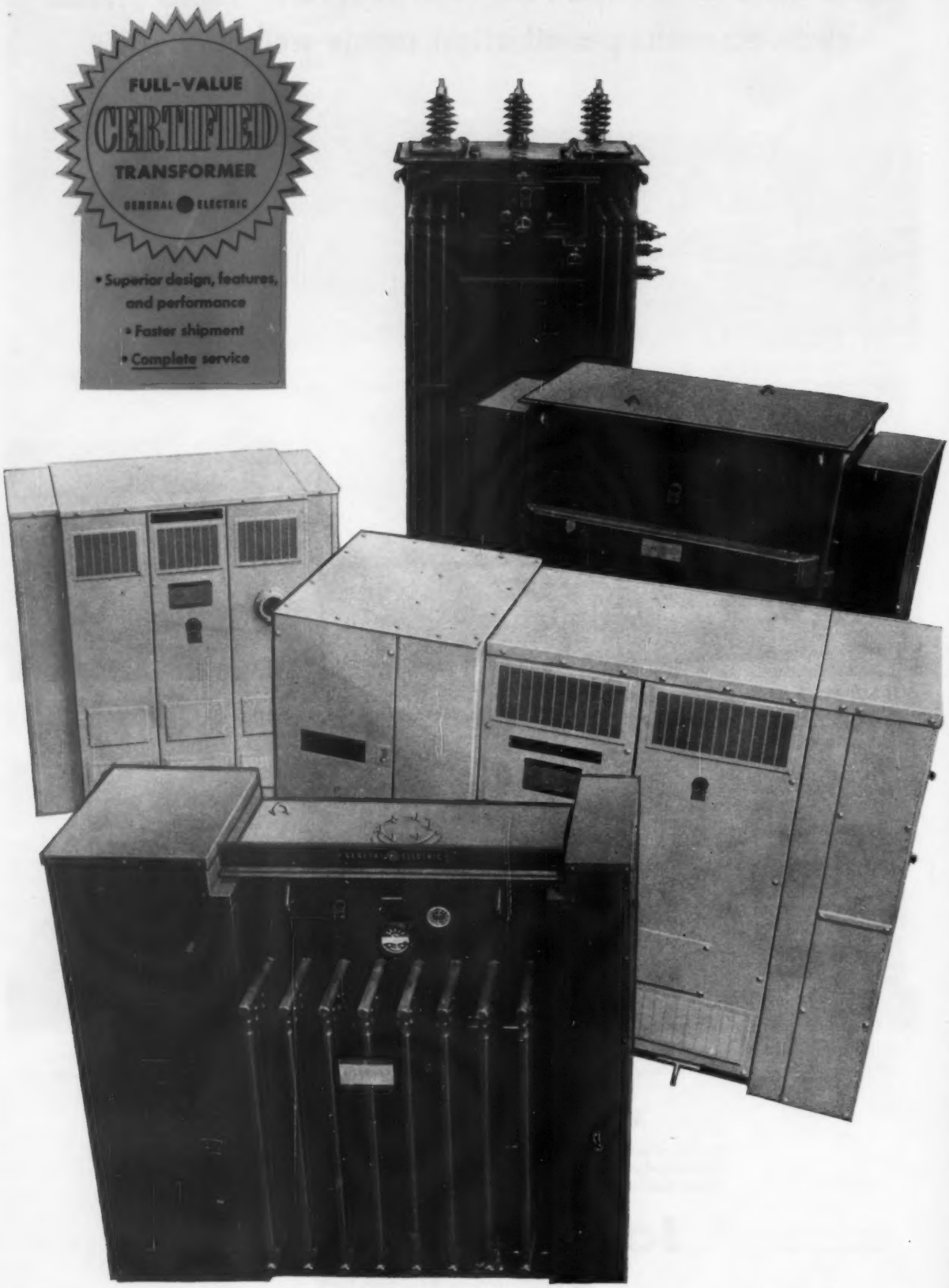
FULL-VALUE
CERTIFIED
TRANSFORMER
GENERAL ELECTRIC
• Superior design, features, and performance
• Faster shipment
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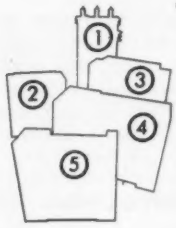
General Electric transformers for industry* are CERTIFIED to deliver full value for your transformer dollar

When considering the purchase of your next transformer, we challenge you to examine the *complete "package"* offered by General Electric. Only when you evaluate all three—product, shipment, and service—can you be sure you get *full value* for your transformer dollar. To emphasize the importance of this over-all evaluation concept, General Electric has developed the Certified Full-value Transformer Program. G.E.'s full line of transformers for industry is certified to deliver full value in terms of superior basic design and features . . . plus faster order handling and shipment . . . plus complete service before, during, and after installation. Evaluate your transformer purchases in this way and we're confident you will recognize G-E superiority.

More than 70 years' experience in the transformer field stand behind the engineering, manufacturing, and research skills and industry-oriented business concepts which contribute to G-E transformer leadership. **Superior design, features, and performance** means that General Electric is first with major product developments such as interchangeable bushings, improved pressure-relief devices, advanced insulations, and lower sound level research. **Faster shipment** means that combined benefits of a large force of G-E sales engineers, computer design capabilities, and repetitive manufacturing facilities result in substantially shorter shipping cycles. **Complete service** by a staff of field-based General Electric application and installation engineers and a network of 50 conveniently located service shops is unduplicated anywhere in industry today.



*
1. Medium transformers (501 to 7500 kva)
2. Open dry-type transformers (300 to 7500 kva)
3. Sealed dry-type transformers (300 to 7500 kva)
4. Integral Distribution Centers
5. Distribution Equipment transformers (112½ to 500 kva)

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Progress Is Our Most Important Product

GENERAL ELECTRIC

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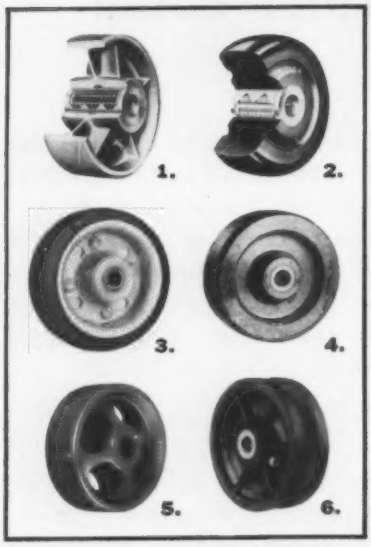
MATERIALS-HANDLING NEWS

NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS

Convenient caster refinements open up new ways to efficient, low-cost materials-handling

Modern Bassick casters have brakes, grooved wheels, shock absorption, sealed bearings, varied attachments, accessories



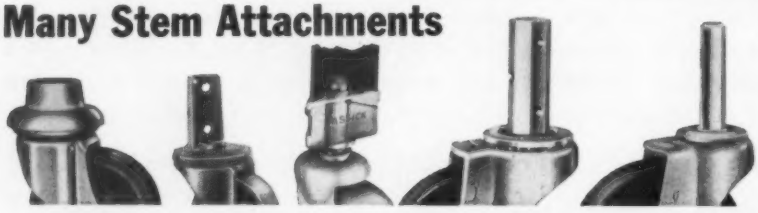
WHEELS FOR EVERY JOB, EVERY LOAD, EVERY FLOOR

Industrial caster wheels have come a long way from the original cast iron design. Today, you may choose (by the numbers at left):

1. Semi-steel wheels for heavy duty over rough floors. **2.** "Atlasite" hard composition wheels for increased floor protection. **3.** Demountable rubber tired wheels with bolted steel discs. **4.** Acid- and heat-resistant phenolic-mascerated canvas composition wheels. **5.** "Biron" powdered metal wheels with self-lubricating bearings. **6.** V-grooved wheels which operate both on inverted angle iron tracks and floors. And several others not shown.

Four types of wheel bearings are also available depending on the application: ball bearings, standard roller bearings, self lubricating bearings and tapered roller bearings.

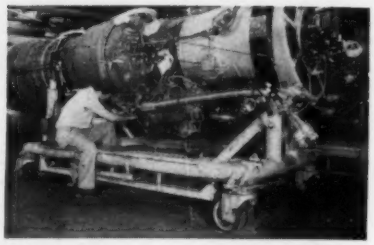
Many Stem Attachments



Stem casters are more suitable than plate casters for certain types of equipment. Bassick offers threaded pipe socket, iron angle plate, rivetless angle iron sockets, octagon and plain round stems (left to right, respectively) and others for all manner of equipment. Also available is a wide variety of plate casters.

Sealed bearings minimize maintenance end hazards of dripping grease

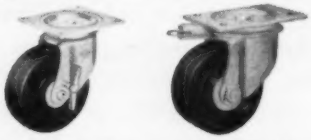
Medium heavy duty (Series "S99") and medium duty (Series "H99") Bassick casters with sealed swivel and wheel bearings reduce caster maintenance to a once-a-year lubrication. They are particularly useful in applications exposed to water or steam that might penetrate unsealed bearings. And being sealed, of course, they do not drip lubrication grease on the floor, an unsightly and hazardous condition.



Shock absorbing feature saves floors, loads, casters

Bassick's "Floating Hub" design, now available in light duty up to heaviest duty casters, absorbs shocks, snubs out vibration.

These unique casters are ideal for handling of liquids, breakable or delicate loads. But they are now finding use, too, in handling heavy loads in power pulled applications over extremely rough floors. Under conditions that kill ordinary casters, Bassick Floating Hub casters keep rolling. And they protect floors, too.



Wheel brakes, swivel locks extend range of equipment you can mobilize on casters

Scaffolds, machine tools, many types of equipment once considered stationary, now roll into position on casters, then stand steady when wheel brakes (left) are applied. Swivel locks (right) let you use equipment either on a straight-line movement job or for general mobility . . . or both.

Distributor can advise

Local industrial distributors who carry Bassick casters can show you the convenient caster refinements described here and often suggest ways you can use them in your handling operation. These men see a lot of plants, a lot of different handling operations. Their know-how, and that of Bassick engineers, is yours for the asking. 9.35

Sweet's

Symbol of SW Excellence

Bassick

A DIVISION OF STEWART-WARNER CORPORATION

THE BASSICK COMPANY, Bridgeport 5, Conn. *In Canada:* Belleville, Ont.

For more facts circle 556 on Reply Card

COURT DECISIONS —a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Tender of Resignation

TWO MEN were hired by a manufacturer in Tennessee — one as chief and the other as an assistant engineer, both for a term of five years. Subsequently, both were transferred to a plant of this manufacturer in Texas. Dissensions arose between them and the manager of the Texas plant over the apprehensions of a local bank of the solvency of the company.

Later after these men discussed the matter with an officer at the home office they tendered their written resignations. The officer pushed the papers aside with the comment that he would not even consider them.

After they had returned to Texas they were advised that their resignations had been accepted. Suit for damages by these employees for breach of their five year contracts was brought against the company. To this action the acceptance of these resignations was interposed as a defense.

These employees were awarded damages by the Tennessee court with the comment, "When two negotiating parties are in each other's presence and one makes an offer to the other without indicating any time for acceptance, the inference that will ordinarily be drawn by the other party is that an answer is expected at once.

"If when the first reply is not an acceptance the offeror turns away in silence the proper inference is that the offer is no longer open to acceptance." Court brief 286 S.W.2d 617, Tennessee.

Secret Process

FORMER EMPLOYEES of a manufacturer which had what it claimed was a secret process of photographically marking precision dials, undertook the manufacture of similar dials by the same process.

Over the entrance to this plant was maintained a "No Admittance" sign and every employee of the company had been told that this process was a secret and that it was their duty to refrain from its use or from its disclosure to others.

In its dismissal of an action brought by the owner of this process for an injunction against its disclosure and use, a New Jersey court said, "The process was known to all employees of this company who had either need or opportunity to be informed. The employees were not restricted to certain locations in the plant. They were generally free to move about.

'Nor' was the formula for the light sensitive solution kept under lock and key. It was posted on a door in the coating room and any employee could open the door and read the formula. The employer cannot render a process secret merely by calling it so—it must in fact be 'secret.' The circumstances surrounding the business and the way it has been carried on from the inception of the secret process must bar the indicia of secrecy." Court brief 96 Atl. 2d 788, New Jersey.

Vertical Price Agreements

IN A FEDERAL court in Colorado, a dealer in electrical appliances charged that competitive retail dealers in Denver had formed a conspiracy to deprive city retail appliance dealers the opportunity of making out-of-state purchases, restricting them to local wholesalers and fixing the prices at which such merchandise should be sold at retail in that city.

This dealer also complained that two daily newspapers limited his advertising to such items as were "obtained through regular channels" at prices and on terms approved by supplying distributors, forbidding him to advertise certain brand named products at any price and for seven weeks had entirely barred his advertising from these papers.

In its decision that on these facts the appliance dealer was entitled to a recovery of damages, the United States Court said,

"It is of course true, without dispute, that a manufacturer is free to make vertical agreements with local agents and dealers for the sale of his wares or products in a given territory for a stated price and he is also free as far as the antitrust laws are concerned, to discontinue his relations with any dealer, so long as his conduct is not aimed at a monopolistic purpose or at market control.

"But any horizontal agreement among local competitors or with manufacturers which has the purpose and effect of stabilizing prices at local levels, or apportioning territories or suppressing competition, is illegal if interstate commerce is utilized or if such concerted acts have the effect of restraining the free flow of interstate commerce." Court brief 250 Fed. 2d 881, Colorado.

Manufacturer-Dealer Relationship

UNDER WRITTEN agreements a manufacturer-dealer contract permitted termination of the relationship at any time.

Over a 15-year period, the dealer contended it had developed a sales organization for the manufacturer's products, that the manufacturer had induced the salesmen of this distributor to violate their agreements with this distributor, had fomented dissention among these employee salesmen and had induced them to to terminate their contracts with this distributor and accept employment with the manufacturer.

"We are not dealing with competition between economic equals," said a New York court, holding this distributor entitled to damages for this interference with its rights, "but rather with the destruction of a relationship between the manufacturer and the distributor which is recognized to be that of dependency of the latter on the former.

"There are a number of provisions in the contract which indicate the existence of this relation. Pursuant to the contract, the distributor was obliged to make its lists of prospective customers available to the manufacturer, to keep records of its demonstrating, canvassing and soliciting available to the manufacturer,

COURT DECISIONS

to give the manufacturer reports on its inventory and its financial condition."

Under these conditions the New York court held the manufacturer to be liable to its distributor in damages for the injuries it had occasioned by this interference. Court brief 144 N. E. 2d 371, New York.

Loss of Profits

UNDER THE CONTRACT for the manufacture of a wire assembling machine, the manufacturer agreed to deliver the machine within five months. It was also stipulated that the machine should produce open line TV transmission wire at a minimum of 3000 ft an hour.

Shortly before the contract was made the purchaser had told the manufacturer that the purpose of the machine was to reduce production costs and increase the output. At the end of 12 months, approximately seven months after the agreed delivery date, the machine was delivered and had a maximum capacity of 400 to 500 ft an hour.

Following the date agreed upon for delivery, the purchaser had manufactured 1,800,000 ft of open line TV wire by its former method at a cost of $21,536.80. By the use of a machine such as the manufacturer had contracted to deliver the production cost of this quantity would have been $16,078.94, a difference of $5,457.86.

The purchaser sued for the recovery of this loss of profits, and the court, in awarding judgment against the manufacturer, said:

"It is well established that damages may be awarded for loss of profits where such profits can be shown with a reasonable degree of certainty." Court brief 296 Pac. 2d 120, California.

Engineering License Statute

ATTACK WAS MADE on a Pennsylvania statute regulating the practice of professional engineering on the ground that it was an improper exercise of the police power of the state.

Those people exempted from compliance with this statute were "officers and employees of a corporation engaged in interstate commerce." In its decision holding the statute unconstitutional and void, the court said:

"What reasonable grounds can there be for permitting officers and employees of corporations engaged in interstate commerce to practice the profession of engineering in Pennsylvania without registration while requiring all officers and engineers of corporations not in interstate commerce to be registered?

"It will be observed that it does not say that these officers and engineers are exempt merely while engaged in interstate commerce. On the contrary they are wholly exempt from registration and may freely practice the profession of engineering in our state. The exemption in hand is of doubtful validity and makes an unwarranted and unjustifiable classification." Court brief 136 Atl. 213, Pennsylvania.

Invention by Employee

SUIT BY A radio manufacturer for the establishment of its right to the patent of a television antenna invented by an employee was met with the defense of the employee that he had been hired merely as a $75 a week draftsman and not as an inventor.

He contended further that his employer had been guilty of unjust enrichment in using and selling the assembly embodying his invention.

This employee, the court said in its disposition of the action, had been engaged and paid to make specific improvements to this apparatus. Together with others, the employee had been ordered to develop the loop to meet specifications and he had done so in the course of his employment.

"Under such circumstances," asserted the court, "the employer is entitled to the invention, if any, and to any patent embodying such invention." Court brief 111 F.S. 762, New York.

Employee's Liability to Employer

SUED BY THE victim of an employee's negligence, an Ohio corporation paid the damages imposed by the court and brought an action against the employee to recover the amount it had paid. When the lower court denied the corporation a recovery it appealed and in its reversal of the judgment, the appellate court said:

"When a contract of employment has been entered into it is an implied condition of such contract, if not otherwise expressed, that the employee is bound to act in good faith and is to exercise reasonable care and diligence in the performance of his duties.

"This duty is implied from the contract of employment and does not depend upon any express obligation assumed in that regard by an employee. And it is a widely recognized rule that an employee is liable directly to his employer for whatever injury or damage is occasioned by the employee's failure to exercise reasonable care and diligence." Court brief 65 N.E. 2d 287, Ohio.

Reasonable Compensation

A NEW ENGLAND manufacturer agreed with an employee who had perfected and patented several inventions, "That the employee will turn over to the employer all future inventions or developments in which case reasonable recognition will be made to him, the basis and amount of recognition to rest entirely with the employer."

When no recompense had been received by this employee after five years, he ended the employment and sued for the "reasonable recognition" promised him under this contract.

"The company was not free to do exactly as it chose," said the court, in its decision of the case. "Its promise was not purely illusory. It was bound in good faith to determine and pay this employee the reasonable value of what it accepted from him."

To this the court added, "We are of the opinion that at the time these inventions were taken over by the company they had a reasonable value of $5,000 and the employee should recover accordingly." Court brief 167 Atl. 79, Maine.

Return of Rented Equipment

OIL WELL EQUIPMENT was leased under an agreement that the lessee pay $12 a day for its use for 25 days. At the end of that period the equipment was not returned but left at the well-side for three months, then put in storage. Two months later it was returned to its owner at the owner's expense.

Sued by the owner, the Texas court awarded judgment against the lessee for the rental from the expiration of the 25 day period until the date the equipment was returned.

"A lessee of this sort, after the lease has ended who continues to hold and use the goods, does so under the original agreement," said the court. "In other words he is in a position comparable to that of a tenant holding over after the expiration of the term.

"The origin of this well settled rule," continued the opinion of the court, "seems to have been in the reluctance of the courts to construe as a wrong what could be justified as a contract and its existence is fully justified as not allowing the lessee to take advantage of his own wrong." Court brief 195 S.W.2d 852, Texas.

LOOK *for safeguards in industrial handcleaners*

SOOTHING LANOLIN

A rich lanolin content in West LAN-O-KLEEN Handcleaner combats the depletion of natural skin oils during washing. It has a retarding effect on the defatting action of soap. As determined by laboratory tests. And confirmed by years of industrial experience.

The lanolin in LAN-O-KLEEN is not milled into the soap by conventional methods. It is impregnated into a corn meal base by an exclusive process. In this way a higher content is achieved. But more important, the emollient is "free" lanolin. By being "free" its soothing and softening action is more positive and beneficial.

LAN-O-KLEEN offers still further advantages. Its corn meal base gently soaks up potential skin irritants with a soft, sponge-like action. A balanced combination of soaps provides high sudsing without excessive hand rubbing. Each pound bulks up to 50% more than most powdered soaps —and lowers costs with proportionately more washings.

FREE TRIAL OFFER. We'd be glad to supply a dispenser and five pounds of LAN-O-KLEEN for free trial. Or if you prefer, we'll send a sample for evaluation. Just call your nearby West office. Or mail the coupon below to our Long Island City headquarters, Dept. 13

☐ Supply trial dispenser and 5 lbs. of LAN-O-KLEEN.

☐ Send a packet of LAN-O-KLEEN for evaluation.

Name _____

Position _____

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When it's Ilg ventilating equipment

Noise in your plant can be more than just annoying. As you know, it often cuts down employee efficiency . . . affects worker comfort and health.

With Ilg electric ventilating equipment, however, noise is not a factor. *You have to listen mighty hard to hear any*

Here's why ILG *fans and motors move more air*

Not a Ripple in the Glass at 1140 revolutions. Ilg direct-connected propeller fans are quiet, vibration-free power savers. Ilg's "One-Name-Plate" pledge of performance covers *both* the dynamically balanced, patented Type "Q" fan wheel . . . the Ilg-built self-cooled, permanently lubricated motor.

Low-Down on Low Silhouette. Ilg power roof ventilators, with lifetime aluminum housings, are low in height, low in operating costs, low in maintenance. Ilg-built self-cooled motor —direct-connected to patented "Q" Type fan wheel—assures quiet, vibration-free operation. Choice of 11 sizes, single-phase permanent-split capacitor or 3-phase motor.

For fans built to satisfy your "specs"...

Each ILG product shown carries the rating seal of the Air Moving and Conditioning Association, Inc.

. . . you have to listen hard to hear any noise

sound at all. At the same time, Ilg fans and ventilators rank high with those who insist on high air volume coupled with quiet operation.

Shown below are some of the reasons why Ilg rates so well with those who buy, specify and *live with* industrial equipment. And for further details on the *complete* Ilg line of electric ventilating equipment, send for Catalog No. 159 on propeller fans, Bulletin No. 257 on *airfoil* centrifugals, Bulletin Nos. 2302 and 2701 on low-height power roof ventilators.

ILG *power roof ventilators more quietly for more years*

"X Marks the Spot" where the traveling mike picks up sound waves from this Ilg BC *Airfoil* centrifugal. Backward Curved (BC) blades eliminate eddy currents and turbulence. Sound tests prove these direct-connected fans can provide larger air capacity than older types—with *no increase in sound level,* with *less drag and shock loss.* For operations to 9" static pressure.

Heart of the Matter. Ilg Backward Curved *Airfoil* centrifugal fans—under this low profile housing—assure smooth, quiet air flow and low shock loss. Ilg-built *self-cooled* motors and *patented* pressure-type cooling of separate motor compartment eliminate heat build-up of *any* type. Direct connection does away with belt maintenance, friction loss, slippage.

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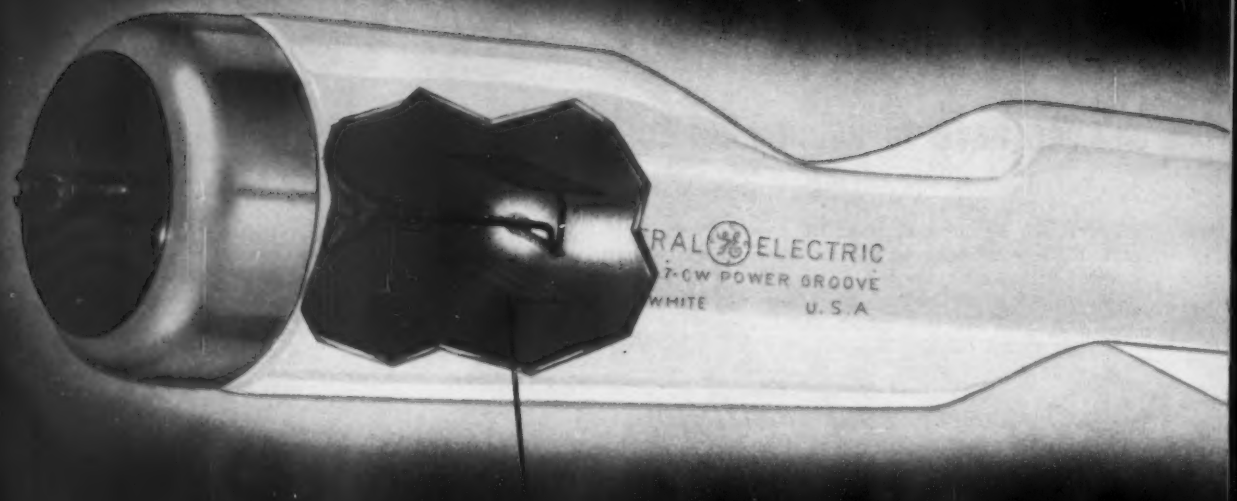
2832 N. Pulaski Road, Chicago 41, Illinois
Offices in 57 Principal Cities
Member of Air Moving and Conditioning Association, Inc. (AMCA)

For more facts circle 558 on Reply Card

NOW! THE MOST POWERFUL



Cathode shield improves anode action (reducing end loss) and collects tiny electrode particles that would otherwise land on glass wall, darkening end of tube. New G-E Power Groove stays brighter...end-to-end...longer!

NEW G-E POWER GROOVE LAMP...

- Gives most users lowest cost of fluorescent light...
- Saves them 10-30% on initial investment alone
- Stays cleaner, brighter longer—no darkened ends
- Will last about 3 years in single-shift service

The new Power Groove is the most recent advance in lighting from General Electric, *your most consistent source for new and improved lamps* to give you more for all your lighting costs. If you are planning a new building, or remodeling an existing one, this dramatic improvement in lighting deserves first consideration.

LOWER CAPITAL INVESTMENT. That's the most exciting aspect of this new lamp. It costs no more than the original Power Groove, yet with all this light you can now plan on—*and get*—a higher level of lighting than was ever practical before. And the investment in lamps and distribution equipment is *even more* practical and economical!

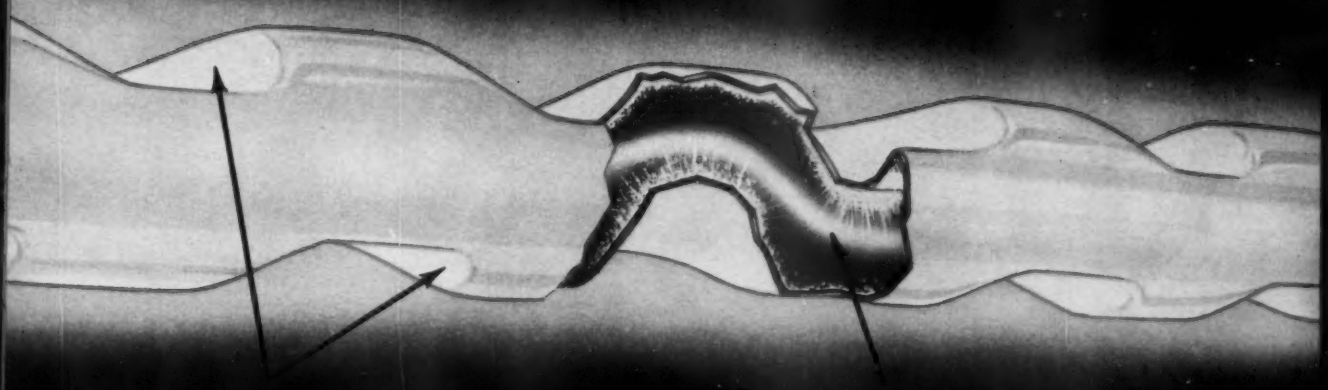
IMAGINE! A single 8-foot G-E Power Groove can deliver a startling 15,000 lumens—the highest light output obtainable from any fluorescent lamp you can buy today. This gives you the lowest cost of fluorescent light for most new lighting systems, and establishes a new set of standards in overall lighting economy.

LIGHT OUTPUT STAYS HIGH. General Electric's efficient cathode shield reduces cathode wattage losses . . . and also collects the tiny electrode particles that would otherwise be deposited on the glass wall, darkening the lamp ends. General Electric Power Grooves now stay brighter . . . end-to-end . . . longer!

When you take your next lighting step, make it a big one. The biggest! As you build or expand, put the economy of the new G-E Power Groove Lamps into your plans. For more information, call your nearby General Electric Lamp Distributor, or write: General Electric Co., Large Lamp Dept. C-909, Nela Park, Cleveland 12, Ohio.

FLUORESCENT YOU CAN BUY!

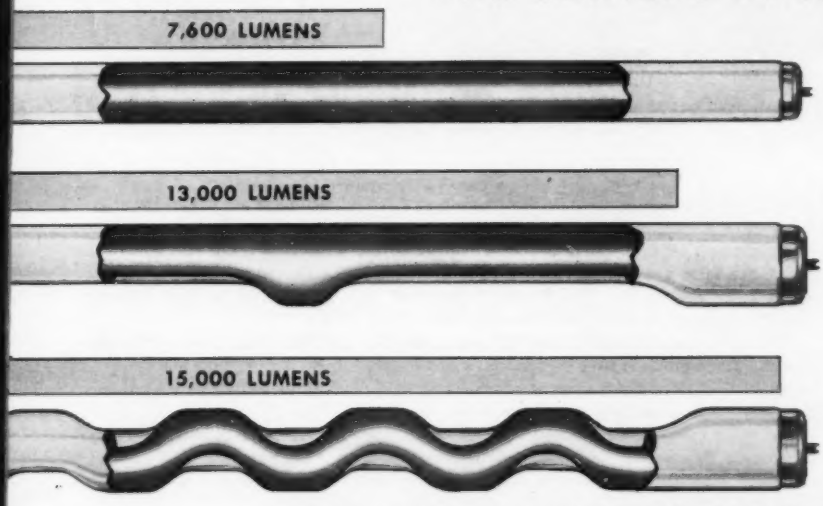
RATED LIGHT OUTPUT 15,000 LUMENS



Grooves or panels "squeeze" arc to increase light-producing power, give you same strength with thinner glass. They also aid light emission, enabling you to use more of total light given off by phosphor.

New configuration makes arc stream travel in a wavy path, makes greater electric power available for producing light. You get the arc equivalent of a 9-foot lamp!

THE SECRET'S IN THE SHAPE



REGULAR FLUORESCENT, shown here in the conventional round shape of the High Output Lamp, has a straight arc stream. As in the case of *any* fluorescent, this arc causes mercury vapor to radiate energy which excites phosphor on inside wall. This, in turn, gives off light.

ORIGINAL POWER GROOVE, developed by General Electric in 1956, has an interrupted groove along one side, continuous except for bridging at regular intervals to increase glass strength. Grooves or panels "squeeze" the arc to increase the light-producing power.

NEW POWER GROOVE has grooves on both sides to accomplish same "squeezing" effect. In addition, it makes arc travel in wavy path—a full foot longer in 8-foot tube! This gives you even *more* light-producing power. New shape also enables you to use more of the total light given off by the phosphor.

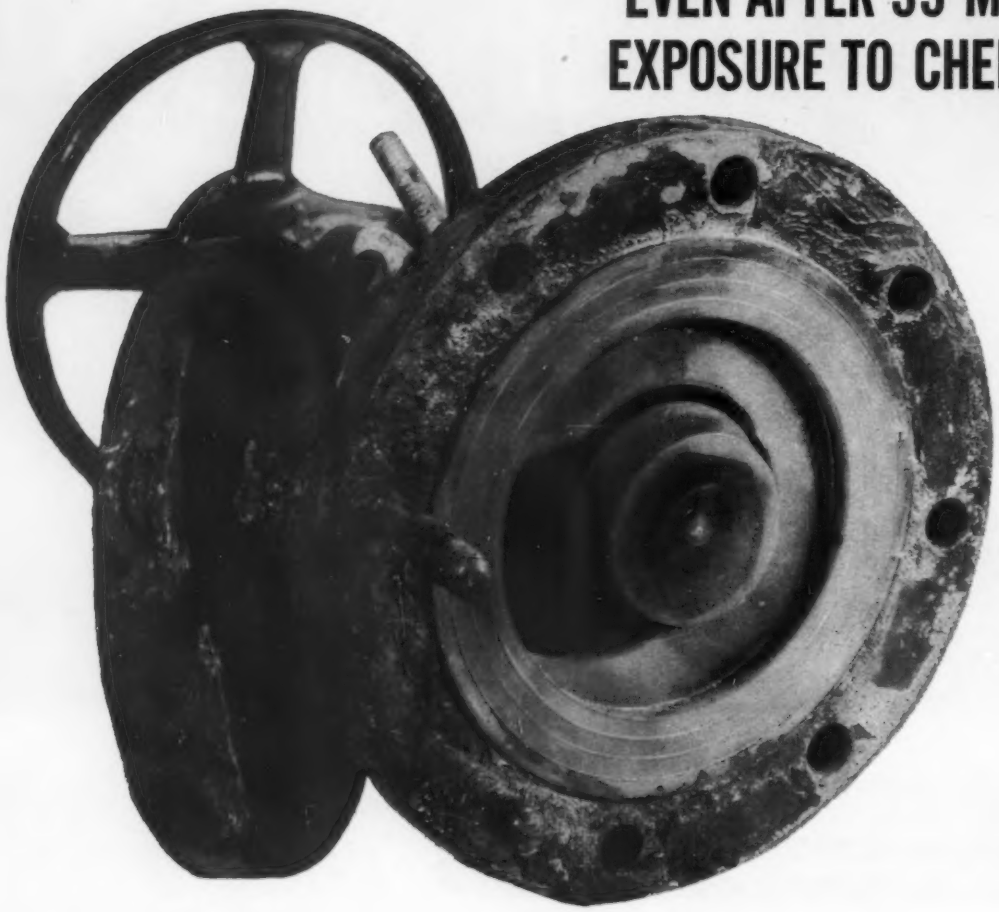
LONGER ARC STREAM, GREATER LIGHT-PRODUCING POWER GIVE YOU
A NEW LOW IN COST-OF-FLUORESCENT-LIGHT FOR MOST INSTALLATIONS

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 559 on Reply Card

HERE'S PROOF THAT PENTON* RESISTS CORROSION EVEN AFTER 33 MONTHS' EXPOSURE TO CHEMICALS



Hercules Powder Company
900 Market Street
Wilmington 99, Delaware

Please send me literature on the properties and uses of Penton and "The ABC's of Penton for Corrosion Resistance."

*Name*_____

*Title*_____

*Company Address*_____

_____

Shown above is an unretouched photograph of a 2-inch William Powell Y-Valve after 33 months of continuous service under highly corrosive conditions. Placed in service in September, 1955, in the inlet to the hydrochloric acid transfer pump in a chemical plant, the valve was removed in June, 1958, when a leak occurred in the gasket at the spool piece connection. The Penton lining and plug are as good as new. Service conditions involved 30 to 33% HCl from 0 to 35°C.

Such "proved in action" case histories are not unusual for Penton—the new thermoplastic polymer with exceptional corrosion resistance. Valves, pipe and fittings, pumps and meters, flame sprayed or whirl sintered metal parts—all are now available with the extra protection only Penton can provide.

To learn more about Penton, write for your copy of "The ABC's of Penton for Corrosion Resistance" and the technical brochure on the properties and uses of Penton. Whether you make or use processing equipment you'll find that Penton may well be the answer to many of your corrosion problems.

** Hercules Registered Trademark for Chlorinated Polyether*

HERCULES POWDER COMPANY
INCORPORATED
900 Market Street, Wilmington 99, Delaware

CP58-9

For more facts circle 560 on Reply Card

Pittsburgh Superfine is quickly cut to correct size with a knife. Cut sections are then bonded to duct with adhesive. Extra adhesive is applied to edges of insulation to adhere them to edges of metal.

"We used one-inch, 1½-lb. density Pittsburgh Superfine Fiber Glass Insulation with a Neoprene coating to line all ducts," says Mr. George P. Fenton. "Superfine is flexible, adaptable and easy to handle."

At Greater Pittsburgh Airport's New Extension— Pittsburgh Superfine Insulates Air Conditioning Duct Work

"When our company installed the sheet metal ducts for the two air conditioning systems at Greater Pittsburgh Airport's new East Dock, we used over 7,000 sq. ft. of Pittsburgh Superfine Fiber Glass Insulation as the acoustical and thermal lining for the ducts," reports Mr. George P. Fenton, General Manager, McIlroy Sheet Metal Engineers and Fabricators, Pittsburgh, Pennsylvania.

Why Pittsburgh Superfine was specified

"This job called for an insulation that could withstand air velocities, would have proven erosion resistance, would provide good acoustical properties at minimum cost, and would insure resistance against temperature differential. Pittsburgh Superfine met all these requirements easily."

Easy to work with on the job

"We've used Pittsburgh Superfine often, and know from experience that it's flexible, adaptable, easy to handle and easy to cut. It's especially adaptable for use in irregularly curved ducts. There was not a single installation problem on the airport job that we could not handle with Superfine," concluded Mr. Fenton.

Pittsburgh Superfine Fiber Glass can help you, too!

It's rot proof, fire-resistant . . . and it's the finest insulation against heat, cold or noise you can get! Available in a variety of facings to meet your needs. For complete information, write to *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Pa.*

PITTSBURGH SUPERFINE IS A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

Sales offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, Minneapolis, New York, Philadelphia, Pittsburgh and St. Louis

FIBER PG GLASS PITTSBURGH PLATE GLASS COMPANY

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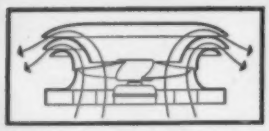
Now! Low cost the Trane Axial

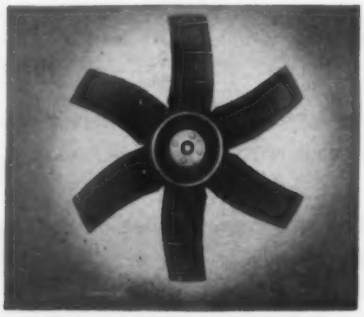


Streamlined design, with annular-vaned hood substantially reduces turbulence and increases efficiency. Fan wheel is mounted above motor in both types of ventilators to allow unobstructed flow of air on discharge side.

Hooded type Axial Roof Ventilator has specially engineered annular turning louvers to reduce pressure loss. May be used for exhaust or summer supply. Meets blackout requirement. Available with three types of positive or gravity dampers.

Vertical exhaust ventilator. This type of new TRANE Axial Roof Ventilator is used to exhaust hot or dirty air. Discharges air straight up, away from roof. Sloping gravity dampers open when fan starts, close when fan stops.

Model B fans—3 or 6 bladed—are furnished with TRANE Axial Roof Ventilators. Fan blades are arc-welded to the spun fan hubs. Stiffeners spot-welded to blades for added reinforcement.



ventilation with Roof Ventilator

New from Trane . . . a low silhouette, high efficiency ventilator that's completely accessible from the roof!

Here's a roof ventilator that will provide economical ventilation for mills, factories, warehouses and all large buildings with open type interiors. It's the new TRANE Axial Roof Ventilator—designed to provide lower silhouette, lower initial cost, low power consumption, complete accessibility from the roof.

Available in two basic types—hooded or vertical exhaust—the new TRANE Axial Roof Ventilators come in five sizes: 24, 30, 36, 42 and 48-inch fan wheel diameter. Models are available to handle corrosive and explosive fumes and gases.

Easy to maintain, these ventilators have easily accessible motors and drive belts; complete assembly pivots for fast service or inspection.

Next time you're planning a factory or commercial ventilation job, make it TRANE! For complete facts, just call your nearby TRANE Sales Office or write TRANE, La Crosse, Wisconsin.

Check these features!

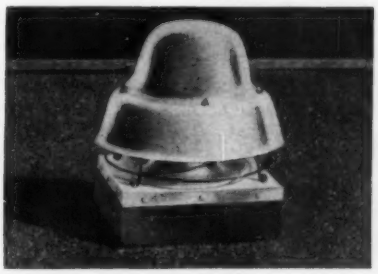
- *AMCA Certified Rating Seal*—Units tested and rated according to the Standard Code of the Air Moving and Conditioning Association (AMCA) and the ASHAE.
- *Low silhouette*—For trim appearance. 24-inch ventilator is only 19 3/16" above roof line.
- *Easy maintenance*—Hood slips off easily for access to motor and belts. Complete assembly pivots. Safety switch on unit permits maintenance man to disconnect fan for service.
- *Quality construction*—All wheels are scientifically balanced. Blades are blanked and die-formed complete with beads to insure permanent set of blade contour. For added reinforcement, stiffening plates are spot-welded to each blade. Motors are totally enclosed.
- *Versatile*—Complete range of five sizes from 24-inch to 48-inch wheel diameter. Two basic types: vertical exhaust, and hooded exhaust or supply. Models available to handle corrosive and explosive fumes and gases.
- *Safe*—Units are available with built-in spring and fusible link to control damper in presence of fire.

For any air condition, turn to

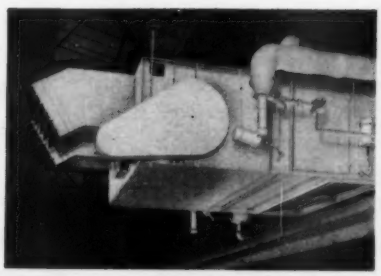
TRANE

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

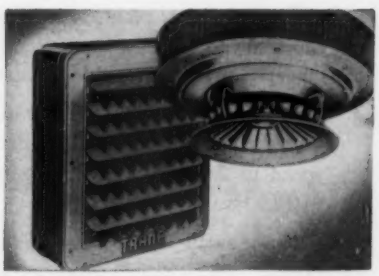
THE TRANE COMPANY, LA CROSSE, WIS. • SCRANTON MFG. DIV., SCRANTON, PA.
TRANE COMPANY OF CANADA, LTD., TORONTO • 96 U.S. AND 19 CANADIAN OFFICES



Centrifugal Roof Ventilator for quiet, high-volume ventilation against higher static pressures. Streamlined, lightweight, compact, easy to install. 16 fan sizes from 7" to 40" wheel.



TRANE Torrivent heats and ventilates large areas. Rugged, efficient centrifugal units handle up to 33,000 cfm. May be installed on floor, ceiling or wall, with or without duct work.



TRANE Unit Heaters—Horizontal or Projection types—put the heat where you want it! Patented diffusion feature gives an unlimited number of heating patterns.

For more facts circle 562 on Reply Card

cranes that stay new

Robbins & Myers cranes have long, productive lives because they combine conservative engineering with quality construction materials—a combination that doesn't permit short-cut manufacturing. Carefully controlled standards are maintained for bridge deflection under load, rigidity, service factor. Your R & M crane is completely assembled and tested before shipment, then match-marked and doweled for perfect reassembly in your plant. R & M builds standard cranes with capacities to 10 tons, spans to 65 feet; larger capacities and longer spans are available in custom designs.

Illustrated above: 15 ton capacity, two hoist, cab controlled crane. Span: 74½ feet. Bridge control: 6 step variable speed to 250 fpm. Trolley control: 4 step variable speed to 125 fpm.

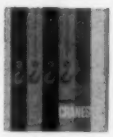
Send today for our new bulletin describing single and double girder cranes in top-running and underhung designs.

Robbins & Myers, Inc., Hoist & Crane Div., Springfield, O.

take it up with

ROBBINS & MYERS

hoists cranes



Request Bulletin 900

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Koroseal knocks out corrosion in auto bumper plant

HOUDAILLE Industries makes and nickel-plates automobile bumpers in this Huntington, West Virginia plant. Regular pipe fails fast when exposed to the hot, highly corrosive nickel solution.

Here, on this filter system, B.F.Goodrich Koroseal polyvinyl chloride pipe and socket fittings solved the problem. Koroseal pipe and fittings are unaffected by most acids and alkalies, completely inert in the presence of oil, alcohol and salt solutions.

Countless manufacturers have solved difficult problems with versatile Koroseal pipe. It's inexpensive, light and easy to install. It can be threaded, cut, welded or drilled. Koroseal pipe has superior insulation qualities, will not support combustion and never needs to be painted.

Koroseal rigid PVC has high impact resistance and is available in tubes, rods, valves and sheets. For information on how B.F.Goodrich Koroseal can make your operation more efficient, more profitable, simply send in the coupon below.

B. F. GOODRICH
INDUSTRIAL PRODUCTS CO.
MARIETTA, OHIO

B.F.Goodrich Industrial Products Co.
Dept. PE-3, Marietta, Ohio

Please send me free booklets on:
☐ Rigid Koroseal Pipe
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Name_____

Company_____

City_____ Zone____ State_____

Koroseal—T. M. Reg. U. S. Pat. Off.

B.F.Goodrich *Koroseal rigid PVC products*

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The battery that makes the difference . . .

"C & D Slyver-Clad® batteries form the major portion of our battery inventory, because we are convinced that C & D provides more battery per dollar . . ."

CLEAN, EFFICIENT WAREHOUSING—C & D batteries power the manufacturer's outrigger rider trucks, walkies, and counterbalanced fork lifts. Rider-type tractor in warehouse above pulls 4-car train of palletized corrugated packages from storage to shipping department.

AMERICAN GREETINGS GETS GOOD BUY

American Greetings Corp., manufacturers of greeting cards of all types and sizes, operates six plants in the Cleveland area. Electric trucks equipped with C & D *Slyver-Clad®* lead-acid batteries are preferred for this rapidly expanding material handling system, because the company's predominantly female employees object to the fumes of gasoline-powered equipment. Greater maintenance expense using gasoline-powered vehicles is also cited.

Why C & D? According to industrial engineers, their annual survey of the progress within the battery field has shown that C & D batteries consistently offer more capacity per cubic foot of space, and over-all life expectancy has been increased.

See the difference—write for Bulletin IT-528.

CLEAN, EASY MAINTENANCE—Drivers just park their trucks at charging area at the end of the shift and connect their batteries to the chargers. The rest is automatic. No mess. No fuss. No lost production time. C & D batteries are "automatically re-fueled" overnight.

MORE BATTERY PER DOLLAR—With heavy usage, company used to experience only 5-year life with old batteries. Use of C & D *Slyver-Clad* batteries has not only increased battery life, but increased C & D capacity keeps the fleet of electric trucks running at full power for a full shift in this high-efficiency material handling operation.

COME SEE US IN '59 — The Material Handling Institute's Exposition of 1959 — JUNE 9-12

C&D

Since 1906

C & D BATTERIES, INC.

of Conshohocken, Pa.... Attica, Ind.

Sales and Service Offices in Principal Cities from Coast to Coast

Manufacturers of *Slyver Clad* ® Industrial Batteries • PLASTICELL and PLASTICS ® Batteries for Communications, Control and Auxiliary Power • Producers of *Autofloy* * Silicon Chargers

*Trademark

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WHAT'S JUST AHEAD IN THIS ISSUE?

- WATER TREATMENT is all done by pushbuttons, now. Makeup feedwater for the steam generators at Monsanto Chemical Company's Texas City plant is handled automatically, thanks to an ingenious control system. Turn the page to get a complete rundown on how the system operates.

- WHEN YOU have a wear problem on a machine or a corrosion problem in a storage tank, had you considered the use of metallizing rather than investing in new equipment? There are many jobs for which this process can be used with satisfactory results. For a review of the uses of metal spraying, both alone and in combination with sealers of the vinyl, phenolic, epoxy, silicone and other types, turn to page 104.

- HOW DO YOU cut the "waste" out of your power bill? Many plants are saving thousands of dollars a year by applying a few simple rules governing the use of demand and energy and making improvements to plant power factor. You can start your program today by turning to the article beginning on page 112.

- IN ONE highly seasonal industry—paint making to be specific—a manufacturer found his shipping aisles and schedules all fouled up. The foul-up was due to lack of space and inability to place shipments in their proper sequence. All this has now been changed. The company engineered its own storage conveyor and can have shipments ready and waiting, in live overhead storage, just panting to appear at the proper moment. How did they do it? See the article starting on page 116.

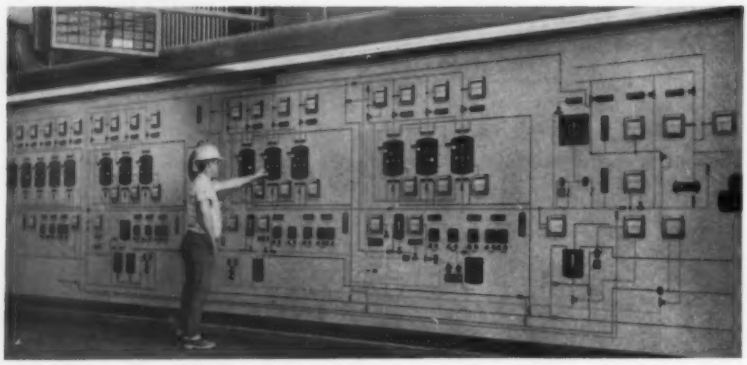
- SUPPLYING machine tools for constantly-changing production requirements can be difficult, However, McCulloch's plant engineering department eases the problem by building special tools from standard machine tool components. The components are kept in stock . . . the machine tools are assembled "to order". On page 119, you can learn how to start your own built-up tool service.

- RESPONSIBILITY and authority for all life-or-limb endangering projects is vested in the plant engineering department at AiResearch, Phoenix. Safety control is just one of the functions delegated by general management to this group of specialists. To read about some of the projects they have tackled, and completed, and the kind of men making up this plant engineering department, see the article starting on page 128.

- CONSTANTLY-STICKING servo valves, whose malfunctioning might ruin an expensive airplane skin section, posed a recurring maintenance problem at Douglas Aircraft. How the maintenance sleuths tracked the problem to its hideout and eliminated it with an oil filtration system is told in the article starting on page 132.

Fig. 1. An orderly array of piping and pertinent equipment in gallery located outside the boiler room. Treating units are along each side of the passageway.

Fig. 2. The panels are grouped in sequence with treatment procedure to form the master panel which is conducive for quick spotting of operating phases.



AUTOMATIC

By PETER L. TREMONT
Utilities Supervisor
Monsanto Chemical Co.
Texas City, Texas

THE PROBLEM of providing makeup feedwater for steam generators at Monsanto Chemical Company's plant in Texas City is solved by parallel use of a fully automatic sodium zeolite softening system and a demineralization system. The ion exchange system's process water varies from 300 parts to 1300 parts per million in total dissolved solids content. Variations in total dissolved solids content normally accompany seasonal changes.

Five zeolite units comprise the water softening plant, with each unit having a flow rate capacity of 250 gpm. The demineralizer plant consists of three cation units, a vacuum deaerator, three weak base anion units and three strong base anion units. Maximum capacity varies from 600 gpm when total dissolved solids content is greater than 1100 ppm to 900 gpm when total dissolved solids are less than 400 ppm.

Boiler feedwater makeup is a blend of the effluents from these two plants plus returned condensate. Normal flow rate of the blend is determined by demand from the steam generators. The ratio of zeolite water to demineralized water blended is controlled to provide water with optimum total dissolved solids content at minimum cost.

Each phase of water treatment comprises a system of its own. The controls and instruments are typical for each system except for differences peculiar to the regeneration phase of each system.

A graphic control panel is provided for each system; all such panels are grouped together in the same sequence as water treatment to form a master graphic panel. See Fig. 2.

WATER CONDITIONING

Inside Graphic Panel Devices Control Flow Through Equipment Outside

All equipment comprising an entire system is illustrated on its respective control panel. Plastic strips represent all piping, each a different color to represent a specific type flow. A symbol is provided for each valve and pump with a small green light mounted on each symbol. The light is energized when its valve is opened or its pump is running.

The master panel houses all timers, relays, flow controllers, flow and pressure indicators and solenoid valves allied to flow controllers necessary to operate each system. All valves, allied solenoid valves, pumps, conductivity cells and controllers, level probes and transmitters are located in the field. See Fig. 1.

Each unit is equipped with its own battery of on-off valves and an inlet flow control valve. Backwash, regenerate and rinse flow control valves are common for a given system.

Sequence of operation is identical for each system and consist of the following phases: 1. Service. 2. Regeneration. 3. Standby. (A unit can be transferred to the off position by means of a manual pushbutton.)

The regeneration phase is further broken down into separate steps in the following sequence: 1. Backwash. 2. Regenerant charge. (Two stages) 3. Slow Rinse. 4. Fast Rinse No. 1. and 5. Fast Rinse No. 2. See Figs. 4, 5, and 6.

The basic instrumentation and control system is typical for each phase. Intermediate time delay relays tie in one phase to another to give the desired sequence of operations.

A typical control system consists of a timer, multi-contact control relays, solenoid valves, electrical level probes, pumps, conductivity cells, controllers and transmitters.

When a timer is energized, various relays connected to the timer become energized. The relays in turn energize solenoid valves which provide air to pneumatically operated controllers and valves. See Fig. 7. This basic control system is expanded to incorporate other features peculiar to a given phase such as energizing pump motors, electrical probes and specific conductance recorders.

Demineralization begins with the entry of clarified raw water to the cation system. Normally, two units are in service while the third unit is either regenerating or on standby. Each unit is equipped with a flow controller-recorder and a totalizing timer. An orifice mounted in the inlet line to the unit transmits a signal to the flow controller-recorder which permits controlling the rate of flow as desired.

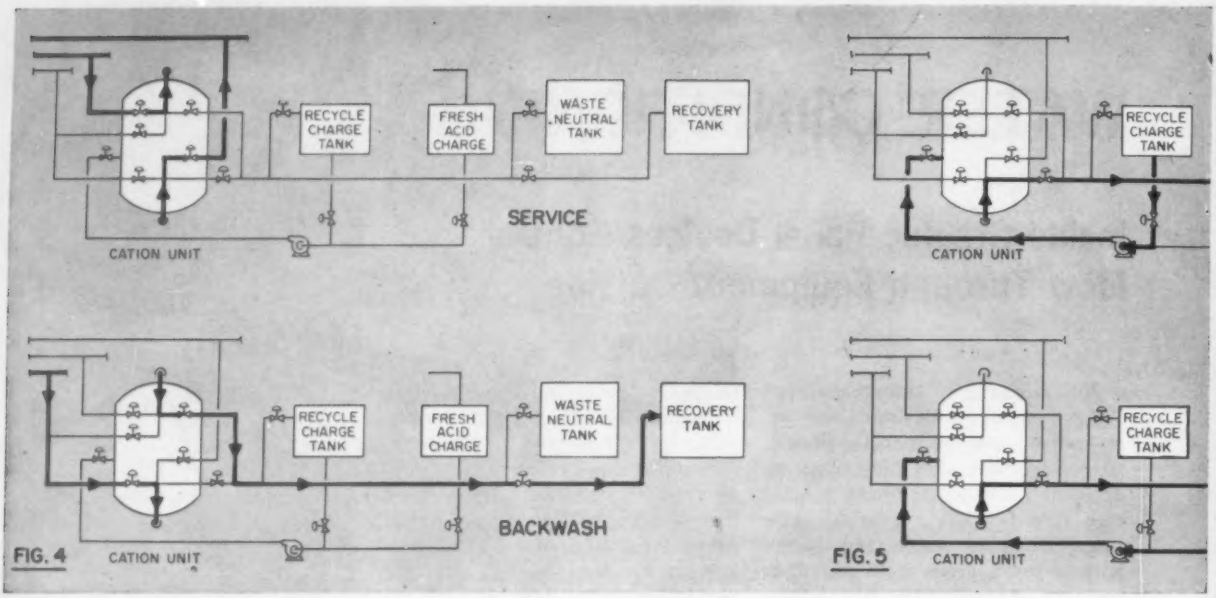
Since the capacity of cation removal is constant for each unit, a totalizing timer is provided to control the quantity of flow through the unit. This quantity is determined by the total dissolved solids content of the raw water which varies with seasonal changes. A dial face calibrated in thousand gallon-per-minute units is mounted on the timer which permits setting the unit for any desired quantity.

The signal transmitted by the orifice is received by a counter which emits an electrical impulse to the capacity timer for thirty seconds for each thousand gallons of flow measured. A dial face gives an accurate indication of the capacity remaining at any time during the service run.

When the quantity of water processed equals the quantity set on the totalizing timer, the timer trips out and closes the inlet and outlet service valves by de-energizing the respective solenoid valves. Simultaneously an intermediate time delay relay transfers the unit to the regeneration cycle after allowing sufficient time for the service valves to close.

If the third cation unit is on standby, it is automatically transferred to the service position. If it is in the regeneration phase, the unit is transferred to service position as soon as regeneration is completed

Fig. 3. Vacuum deaeration takes place at elevation of 130 ft above ground.



Figs. 4, 5, and 6. Flow through a cation unit is controlled through automatic operation of valves for each stage.

and the unit "timing out" must await its turn.

When the unit transfers to the regeneration cycle, it immediately enters the backwash phase of this cycle. An orange indicating light, mounted on the unit symbol, as well as the backwash timer, and an indicating light are energized. The backwash timer opens all valves necessary to permit reverse flow through the unit. An on-off valve in the discharge header which is common to all units opens, permitting reclamation of the backwash water.

A flow controller-recorder controls and records the rate of flow. The controller can be set for any desired flow rate. The backwash timer is calibrated in minutes and time can be adjusted to provide any desired quantity of backwash water.

Upon completion of the backwash period, the backwash timer trips out, deenergizing the backwash phase and energizes the time delay relay. Again the relay interrupts the sequence of events long enough to permit closing of the backwash valves.

The time delay relay transfers the unit to the regenerant charge phase. In this phase, electrical probes mounted in the regenerant acid charge tanks are substituted for the totalizing timer with the following events (See Fig. 5) occurring simultaneously:

1. An acid pump starts. (Two pumps are provided which alternate automatically.)
2. An on-off valve opens permitting pump suction from the reclaimed acid tank.
3. An on-off valve and flow control valve on the pump discharge header opens to permit acid flow to the unit. The flow controller permits varying rate of acid flow as deemed necessary.
4. Unit on-off valves open to permit flow through the unit and into a waste discharge header that is common for each system.
5. An on-off valve on the header diverts the effluent to a water collection tank where it is neutralized before dumping to the sewer.

Pump Suction Switching

When the level drops below the low-level probe in the reclaimed acid tank, the probe switches pump suction to the fresh acid charge tank by opening one valve and closing another. As with reclaimed acid, the amount of fresh acid used per regeneration is determined by probe settings on the charge tank. When the level falls below the low-level probe, the cation unit is transfered to the slow rinse position.

The level in each charge tank must drop below the low-level probe before the next event can occur. Consequently, the proper amount of acid required per regeneration is assured. Upon transferring to the slow rinse position, (See Fig. 6) the slow rinse timer is energized and its associated valves are opened. The period and rate of slow rinse can be adjusted as desired. During slow rinse both regenerant charge tanks are refilled to the original volumes.

An on-off valve in the fill line to the fresh acid tank is opened by the low level probe. Thirty per cent hydrochloric acid flows by gravity from a storage tank to the charge tank until the level reaches an intermediate probe. At this point, the acid supply valve is closed and the valve in a water supply line opens for dilution purposes. The amount of dilution water added to the charge tank is controlled by the setting of a high level probe. Normal setting provides for dilution to 10 per cent hydrochloric acid.

When the level of the mixture reaches the high-level probe, the water supply is shut off and an acid pump starts. The pump recirculates the mixture to insure a homogeneous mixture of dilute acid. Period of circulation is controlled by a time delay timer. When the timer trips out, recirculation stops and the acid

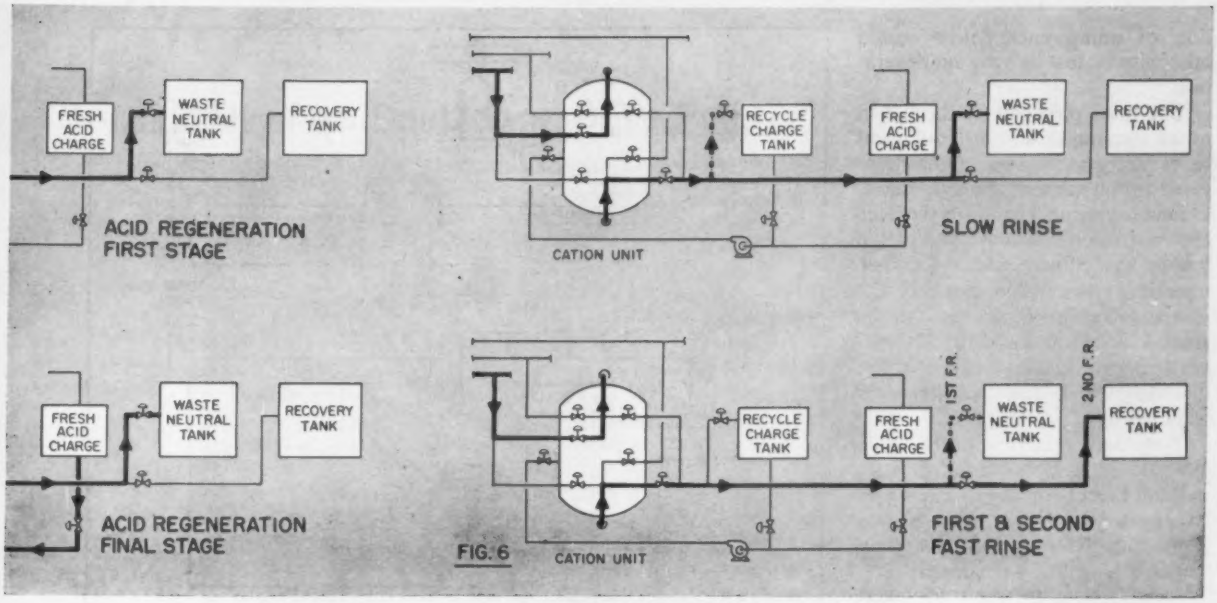


FIG. 6

Regeneration phase has five separate steps starting with backwash through succeeding stages shown in illustrations.

is ready for the next regeneration.

The concentrated acid can be diluted to any desired concentration by adjusting the probes. In addition, the period of recirculation may be varied as necessary by resetting the time delay timer. Since the preset amount of concentrated acid must be charged before water can be added, the proper amount of acid is assured for each regeneration.

Fresh acid normally used to regenerate the cation unit is displaced with slow rinse water. The effluent is diverted to the reclaimed acid charge tank until the level reaches the high-level probe. At this point, the probe diverts the effluent to the waste water collection tank to be neutralized before discarding to the sewer. The unit switches to the fast rinse phase in the usual manner when the slow rinse timer times out. See Fig. 6.

The fast-rinse timers with a common flow-rate controller divide the fast rinse phase into two separate stages. The first fast-rinse timer diverts the initial rinse effluent to the waste neutralization tank for disposal and is set to time out as soon as the quality of the rinse effluent equals the quality of the cation influent. The first fast-rinse timer, upon timing out, switches the unit to the second fast-rinse timer which continues fast rinsing, but diverts the effluent from the waste water tank to the claimed water system.

Normally, fast rinse continues until the fast-rinse timer times out. However, a specific conductance recorder with alarm contacts is provided to insure water of optimum quality and prevent excessive rinsing should the quality of the water be acceptable before the timer times out.

Conductivity Cells

Two conductivity cells are mounted in the lower part of the resin bed, with one located at the bottom of the bed. The cells measure the difference in conductivity of the water at these points in microhms. As long as the differential conductivity exceeds the control setting on the controller, the unit will remain in the final rinse phase.

If the timer times out before the quality of the water is acceptable, the controller "locks" the unit in the final rinse phase and rinsing continues. Should the differential conductivity continue to exceed the control setting at the end of the additional rinse period, an alarm sounds and the unit continues to rinse until clear or until the controller is tripped manually. Should the differential conductivity decrease below the set point before the timer times out, the controller trips the timer and the unit is placed in the standby position. When the unit transfers to the standby position, the unit totalizing timer and the regeneration timers are automatically reset.

The next phase of water treatment is the removal of dissolved gases in the cation effluent by vacuum deaeration. See Fig. 3. Deaeration is provided primarily to remove oxygen and chlorine present in the water which is necessary to prevent oxidation and subsequent deterioration of the weak-base anion resins. In the process, carbon dioxide is also removed. This is important economically since the strong-base anion resin is capable of removing carbon dioxide ions. Removal of carbon dioxide by deaeration doubles the capacity of the strong-base resin and reduces regeneration costs by 50 per cent. A combination flow control and spray valve is operated by a level recorder-controller which controls the flow to the deaerator.

A most interesting feature which typifies the engineering applied to the entire plant is incorporated in this phase of treatment. The cation influent pressure is sufficient to elevate the liquid effluent to a head of 130 ft. Consequently ,the vacuum deaerator was mounted on a tower at this elevation to permit utiliza-

tion of pump energy that would otherwise be lost by vacuum deaeration.

The head provided by the height of the vacuum deaerator is sufficient to permit gravity flow of the deaerated cation effluent through the remaining systems. Therefore, the need for corrosion-resistant pumps to handle the effluent and subsequent operating costs were eliminated. The deaerated effluent proceeds to the weak-base anion system for removal of anions. This system completes the removal of dissolved solids except silica.

Automatic operation of the weak-base system is identical to the cation system except for peculiarities pertaining to the regeneration phases. Consequently, only the events peculiar to this phase are described.

When the anion unit backwash timer trips, the valves reset to the "regenerate charge" phase and the following events occur simultaneously:

1. A caustic supply pump starts. (Two pumps are provided which alternate automatically.)

2. An on-off valve and flow control valve open to permit flow to the unit. The flow controller-recorder permits varying rate of flow as deemed necessary.

3. Unit on-off valves open to permit flow through the unit, into the waste discharge header.

4. An on-off valve in the header diverts the effluent to the waste collection tank where it is reclaimed or used to neutralize waste cation water.

A totalizing timer, calibrated in one-thousand-pound units, controls the quantity of caustic required per regeneration. As previously described, flow must exist for the timer to energize and subsequently trip out. Consequently, it is not possible for the timer to transfer the unit to the slow-rinse phase until the quantity of the regenerant flow through the unit equals the quantity set by the timer. Therefore, proper regeneration is assured.

The dilute (4 per cent) caustic storage tank also serves as the regenerant charge tank. A continuous inventory of regenerant caustic is maintained in the tank by two electrical probes mounted in the wall of the tank.

When the level in this tank falls to the low-level probe setting, the probe initiates the flow of 50 per cent caustic and dilution water. The dilution water flow rate is controlled by a flow controller-indicator. A ratio controller proportions the flow of 50 per cent caustic to the flow of dilution water and may be adjusted to provide dilute caustic solution of any strength desired. The flow of dilution water and 50 per cent caustic stops when the level in the tank reaches the high-level probe setting. The high-level probe is located so that sufficient volume remains in the tank to reclaim the strong-base anion slow-rinse effluent.

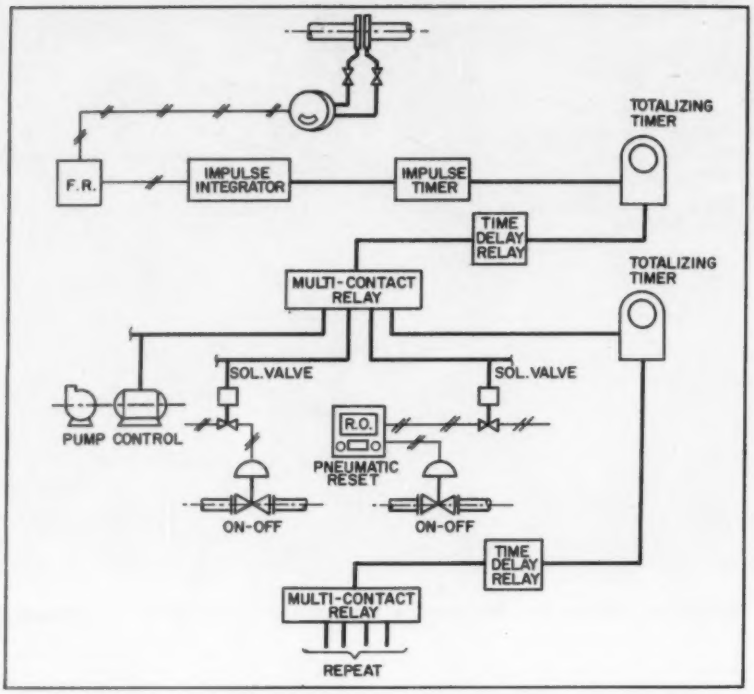


Fig. 7. In typical basic control system relays connected to a timer are energized; they in turn energize solenoids that permit flow through air lines.

As with the cation system, the slow-rinse and fast-rinse effluents are diverted to the waste water tank and used to neutralize waste cation effluents. The second fast rinse is diverted to the reclaimed water system. A specific conductivity recorder is provided to insure water of optimum quality and prevent excessive rinsing.

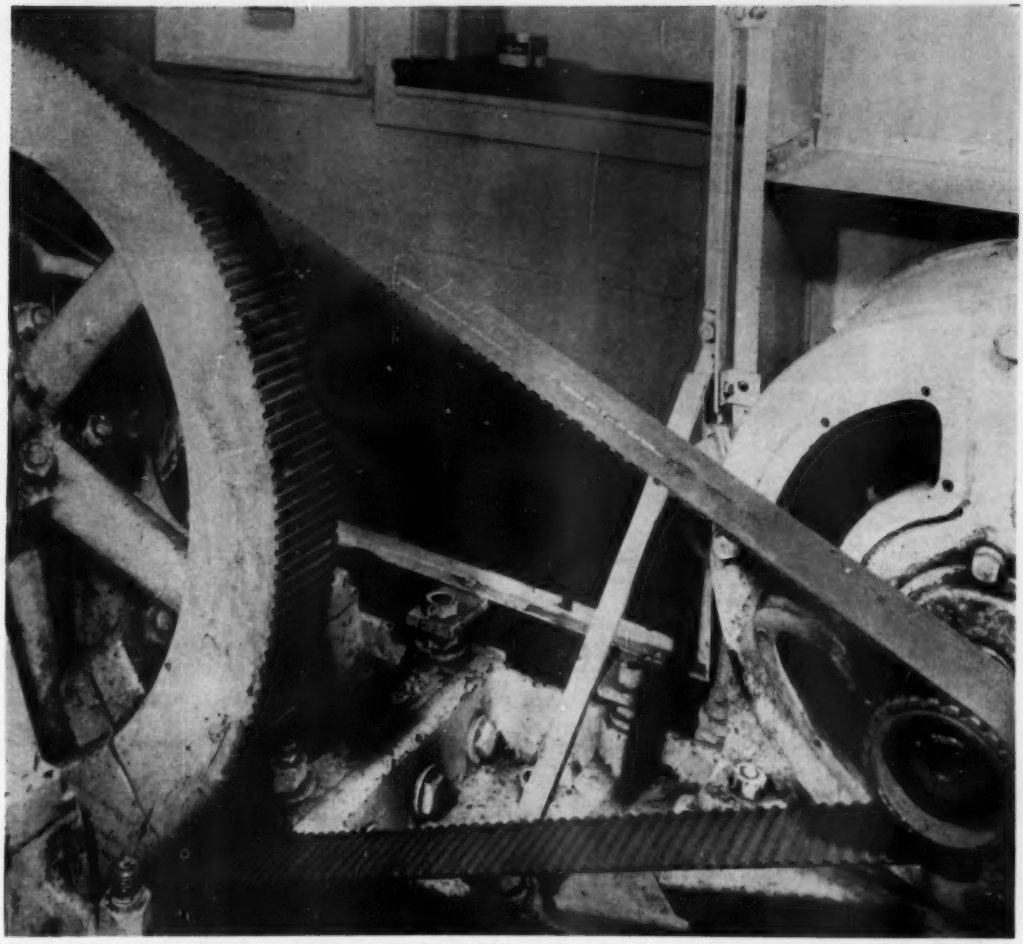
The weak-base anion effluent upon leaving the system enters the strong-base anion system for final chemical treatment. Function of the two resins is identical except that strong base resin has a greater affinity for anions and is used to remove anions unaffected by the weak-base resin.

Dilute caustic used to regenerate both resins is of nearly equal concentration. However, caustic used for strong-base regeneration must be preheated to assure complete regeneration. Furthermore, this caustic can be re-used to regenerate weak-base resin. These features effect the only differences between the two control systems.

The same type ratio control system used to proportion caustic to water for the weak-base system is used for the strong-base system. The dilution water and 50 per cent caustic enters a mixing chamber, then a heat exchanger prior to entry into the unit being regenerated. Steam used to preheat the caustic is controlled by a temperature recorder-controller. Temperature of the caustic is normally set at 95 F.

The treated water is collected in a storage tank but can be used directly if desired. A storage tank and pumps permit recycling of reclaimed backwash and second fast-rinse water into the raw water inlet header at the cation units. Dilution increases the service run of each unit and reduces costs. **End**

Flywheel Doubles as Drive Pulley



Three-inch-wide timing belt transmits power from 10-hp motor directly to flywheel, to drive gas compressor.

Flywheel Takes Belt In Its Teeth

CUT TEETH on the periphery of a compressor flywheel, replace the pinion on the drive motor shaft with a "timing belt" pulley, wrap a timing belt around the flywheel and the pulley—and you've got an economical alternative to a chain drive. At Liebmann Breweries, Inc., Orange, N. J., this procedure was successfully applied to a carbon dioxide compressor, driven by a 10-hp, 1150-rpm motor.

The flywheel on the compressor is approximately 24 in. in diameter. Teeth were cut into the flywheel to fit the ½-in. pitch of the timing belt. In this toothed-belt drive, the relation between the timing belt and its matching pulley is similar to that between an internal ring gear and its pinion.

The belt teeth are molded from neoprene and covered with a facing of tough nylon duck. In the belt's core are continuous, helically-wound steel cables, which constitute the load-carrying elements.

The drive has been in continuous operation 24 hours a day, five or six days a week since 1956, according to the brewery's chief engineer, and has not yet required maintenance time nor replacement parts. Both the timing pulley and the belt were purchased from T. B. Wood's Sons Co., Chambersburg, Pa. **End**

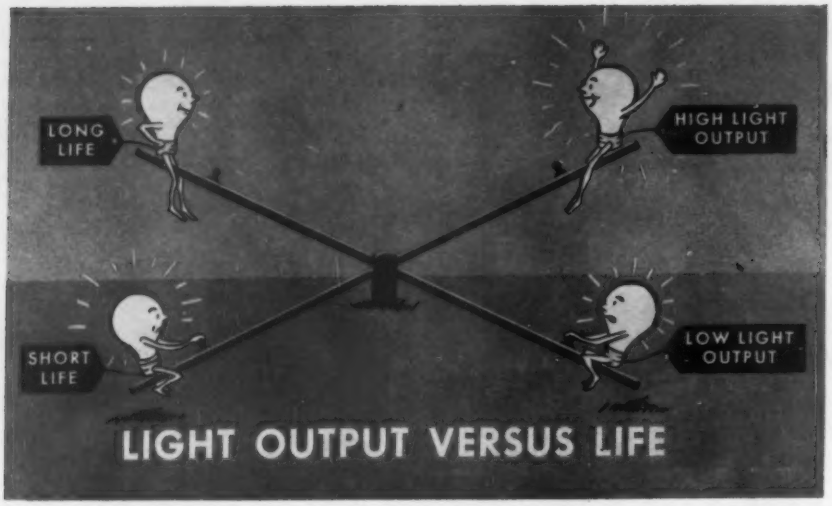


Fig. 1. Seesaw analogy shows you cannot have both long life and high light output.

DO LONG LIFE LAMPS PAY OFF?

Three Factors Determine Economical Life

By M. N. WATERMAN, Lamp Division, Westinghouse Electric Corporation, Bloomfield, New Jersey

LIGHT BULBS for various purposes are offered by manufacturers with advertised lives all the way from six hours to around 12,000 hours. A natural question under these conditions is: How long should a light bulb last? Any plant engineer can answer this question by considering a few facts and applying a little simple arithmetic. There need be no mystery about which lamp life is best for your operations.

It may be helpful to establish a basic fact which necessarily enters into every calculation and choice of lamp life rating. Life and light output of an incandescent lamp are governed by this simple law: The higher the light output, the shorter the lamp life, or conversely, the longer the lamp life the lower the light output.

Illustrated in Fig. 1, this law is based on the fact that life and light output of lamps of the same wattage depend primarily on the operating temperature of the filament. The fine wire filament in a projection lamp gets much hotter than the wire in a standard line incandescent lamp. Just as water in a kettle will evaporate faster when more heat is applied, so the filament evaporates more quickly when it is hotter.

Because of this law, filament lamps for different applications are designed with different life ratings and corresponding light outputs and efficiencies. Light output is expressed in lumens, and efficiency of a lamp is measured in the amount of light produced compared to the amount of power consumed. This is generally expressed as lumens per watt and the higher this figure is the higher the efficiency.

Since a projection lamp is burned only for the short periods required to show slides or movies, it is designed for short life, about 25 hours, and high efficiency, 24.8 lumens per watt. A standard 100 watt light bulb has a design life of 750 hours and a corresponding efficiency of 16.4 lumens per watt.

This is the most economical design for users where relamping costs are low. Reflector lamps which cost more than ordinary lamps are designed for 2000 hours life. Lamps for hard-to-service locations are designed for 2500 hours and have efficiencies of about 13.7 lumens per watt in 100 watt sizes. They are specially designed to provide economies in lamp replacement expense.

Each time the life is lengthened the light output decreases. For most purposes 2500 hours is as far as it is economical to go. At longer lives the cost of lighting rises substantially.

Since the purpose of a light bulb is to produce light efficiently and economically, let us consider what elements comprise the cost of obtaining light. These are the cost of the light bulbs, cost of the electricity they consume and the cost of the labor to replace burned-out lamps.

Here is an example that illustrates that power costs are usually found to be seven to eleven times

as large as lamp costs. A standard 500 watt lamp designed for 1000 hours of operation costs approximately $0.70 net. Burned for 1000 hours, this lamp will consume 500 kwhr. With power at $0.01 per kwhr, power costs will be $5.00. With power at $0.02 per kwhr, power costs will be $10.00, Fig. 2.

It can be seen that any change in lamp design that affects the amount of electricity used will have a large effect upon the cost of lighting because cost of electricity is the big factor in the total cost.

What happens when a lamp designed for very long life and resulting low light output is used? Let us assume that we have a 500 watt lamp designed for 10,000 hours of operation. This lamp would produce 7400 lumens compared to the 9900 lumens produced by the conventional 1000 hour 500 watt lamp. This is a ratio of 1.33 and means that 1.33 times as many 10,000 hour lamps would have to be used to get equal illumination.

The cost of electricity at $0.02 then becomes $13.30 instead of $10.00, giving an added cost of $3.30 for the same light over a 1000 hour period. This amounts to $33.00 additional power cost over a 10,000 hour period.

Obviously this added cost is greater than the bulb cost because even if the 10,000 hour lamp cost the same as the 1000 hour lamp, the bulb cost in 10,000 hours would only be nine times $0.70 or $6.30. Actually most long life lamps cost considerably more than standard lamps.

What about the third factor in the cost of lighting, namely the cost of labor for relamping? Obviously this varies in every situation and may be a significant factor in industrial plants. The magnitude will depend upon the labor rate, accessibility of the lighting fixtures and whether the lamps are replaced one at a time or in groups.

For these reasons an alert plant engineer will analyze his cost of lighting in terms of the three factors of lamp cost, electricity used and relamping costs plus consideration of the cost of inconvenience and disturbance. A lamp replacement operation in the middle of a busy plant can be costly.

The results of this analysis will show that the most economical lighting from filament lamps will be obtained from the high efficiency bulbs rated at 1000 or 2500 hours life. If, for any reason, longer lamp life is desired the best solution will be to use fluorescent or mercury lamps offering 6000 to 8000 hours of useful life at even higher efficiencies than obtained with filament lamps.

Because of these facts, most incandescent lamps designed today for plant and outdoor lighting are rated at 1000 hours for standard lamps used for general lighting, 2000 hours for reflector lamps and 2500 hours for extended service lamps used in hard to reach locations.

Balancing light output with best life to obtain maximum efficiency is the way to obtain the least expensive lighting, Fig. 3. This is because the cost of lighting is influenced more by the cost of electricity used to light the lamp than it is by the cost of the lamps themselves. Lamps offering very long life also offer far less light than that normally obtained from a standard lamp of the same wattage. **End**

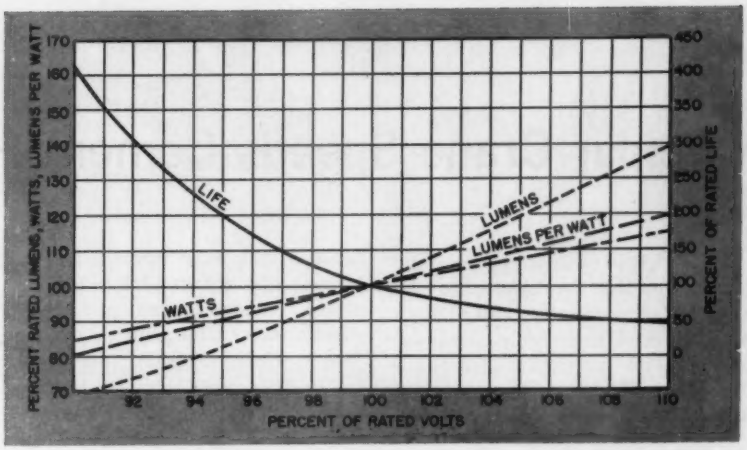


Fig. 3. Characteristic curves of filament lamps show relation of light to lamp life.

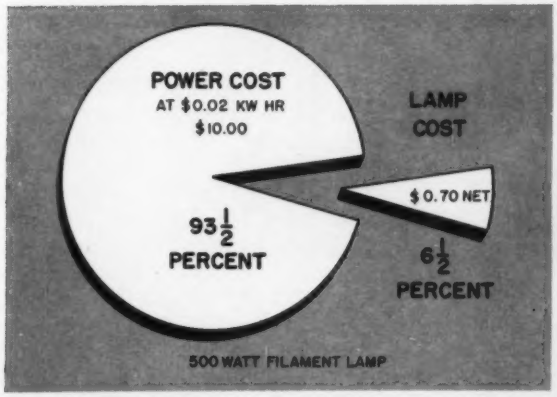


Fig. 2. Power consumed during life equals cost of 14 lamps.

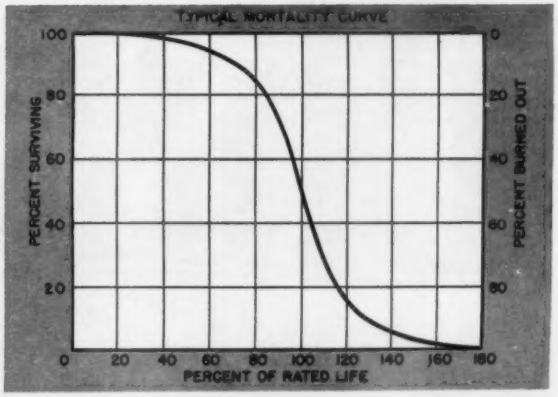


Fig. 4. All filament lamps do not have exactly the same life.

Circular Crane Speeds Cement Pipe Pouring

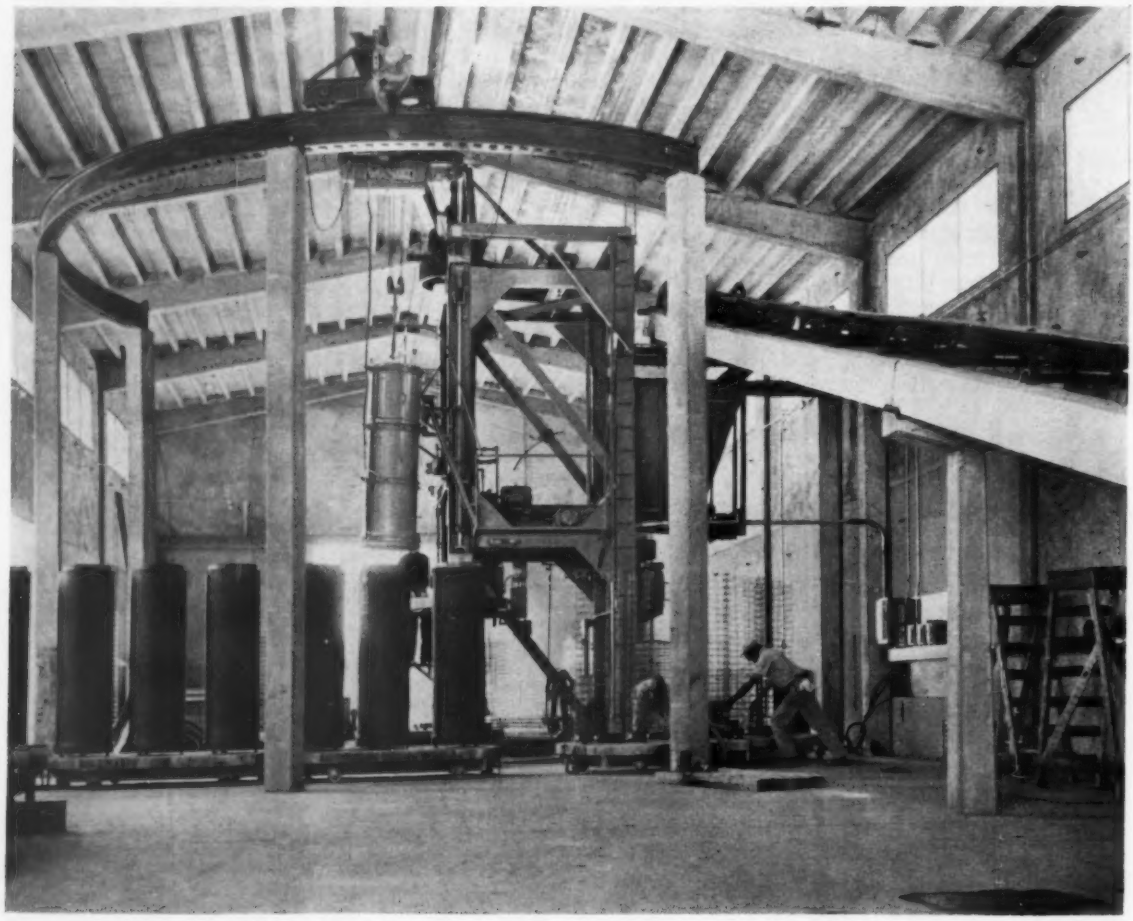
BETTER MATERIALS handling shares the spotlight with increased operator safety and productivity through this highly successful and unusual application of a circular crane and hoist at the plant of the Fountain Sand & Gravel Company, Pueblo, Colorado.

Fountain Sand wanted a versatile unit—one that would materially reduce handling and, by the same token, reduce the costs of pouring cement into molds for the fabrication of reinforced concrete pipe. A traditionally tough, heavy and often hazardous job, it is now being handled with ease through the ingenious application of a 6-ton capacity circular crane and hoist which was manufactured by the Wright Hoist Division, York, Pa.

The new hoist rides on a semicircular track which is mounted close to the ceiling of the production area. An operator, in the center, is visible in the photo positioning the loaded molds onto movable carts for storage during curing operations.

When the concrete mixture is properly cured, the carts are moved into position and another operator uses the hoist and crane unit to lift the cover from the pipe section and move it under the mixing chamber to accept additional batches.

The hoist unit, operating from a power supply source of 240 volts, 60 cycle, 3-phase current, is of ample capacity to handle any size of concrete pipe manufactured by Fountain Sand. A conveyor belt, upper right, is utilized by this fabricator to supply the bin hopper with all the components of the mix such as sand, gravel and cement. Water is furnished through a system of proportioning valves. **End**



Crane shown lifting cover from pipe section preparatory to moving it under the mixing chamber to receive another batch.

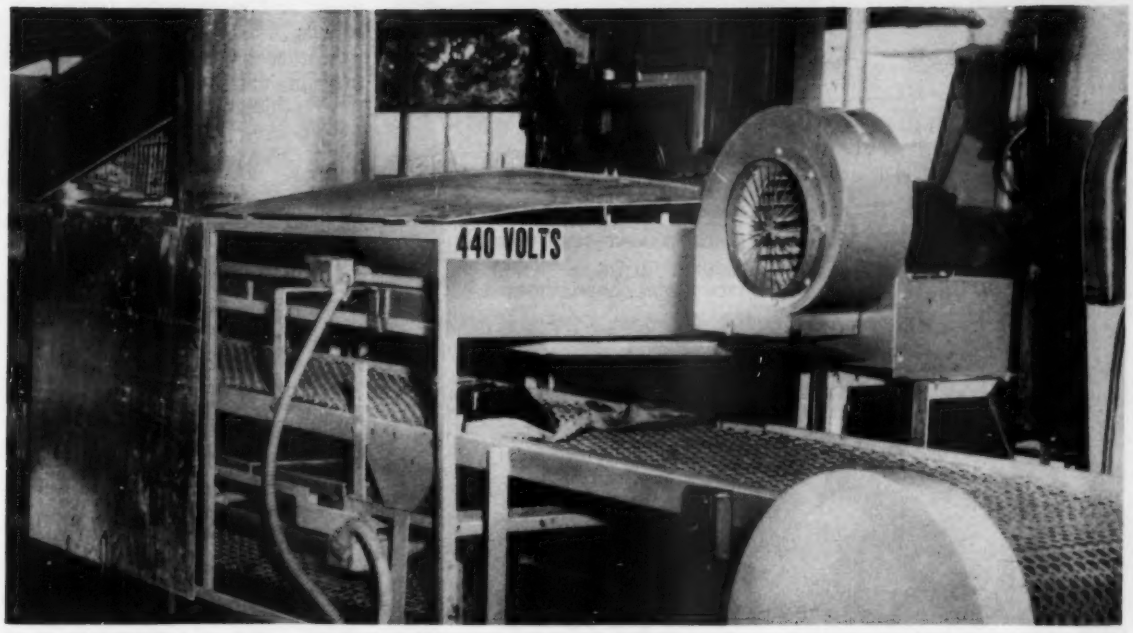


Fig. 1. Radiant heaters are installed above and below conveyor belt, in this picture, as a part of a shoe processing line.

INFRARED HEATING—WITH GLASS

New Elements Cut Both Space and Power Needs

A NEW CONCEPT in infrared heating is being put to increasing use in industrial applications. Paradoxically, the heating element is a panel of borosilicate glass, long known for its heat resistance and electrical insulating properties.

Onto the back surface of this glass is fired a thin, transparent, electrically-conducting film of metallic oxide. This is the source of radiant energy supplying heat up to 660 F. Radiation furnished is in the order of 5 to 20-micron wave lengths.

The heaters were introduced by Corning Glass Works after 10 years of research and field testing. They are being used today for drying, curing, baking and preheating. Applications range from drying playing cards to dehydrating bouillon cubes.

Advantages, Applications

Advantages offered by this type heating are pointed up in a listing of specific applications. The uniform heat the panels provide over wide areas, along with accurate temperature control, is vital in many installations.

A Chicago firm which fabricates display forms from high impact styrene requires heat to soften the styrene to permit shaping. The heat source had been placed 5½ in. from the product. Despite screening attempts—some of them fairly ingenious—the firm was running 40 per cent rejects due to localized overheating.

Two radiant glass heaters, 16 by 24 in. in size and emitting 2500 watts each, replaced the wire units. The heaters operated only 1 in. from the product. Reject rate was cut to 1 per cent—and the manufacturer reports the product has better appearance. This, despite the fact that styrene is transparent to practically all wave lengths and is one of the most difficult materials to heat by radiation.

A midwest food company uses radiant glass panels for heating glass jars before filling them with cheese. Temperature control is essential. If the temperature drops below 160 F, it results in an inadequate seal of the cap. If the jars are heated above 175 F, the cheese discolors.

This heating task is complicated by the fact that jars are fed to the line from either a warehouse at 70 F or directly from freight cars at 40 F or lower.

Twelve Units Do Job

Twelve 16-in. by 24-in. units (3500 watts) were installed 2 in. above the open tops of the jars as they move along the conveyor belt. Provision was made to raise or lower the heater to provide full temperature control.

Company engineers report clean and fast heating. They now plan to install seven more cheese lines and additional heater lines to preheat jars used for salad dressings.

Substantial power savings have been noted by several companies making use of the heating panels. Such savings are effected by the

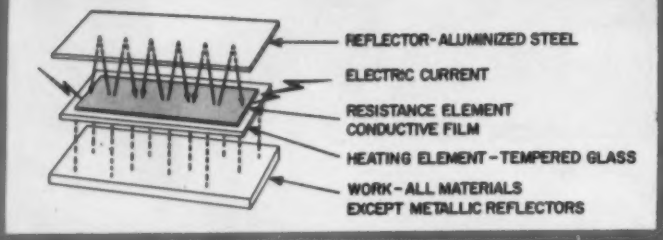


Fig. 2. Diagram explains principle upon which radiant heater operates.

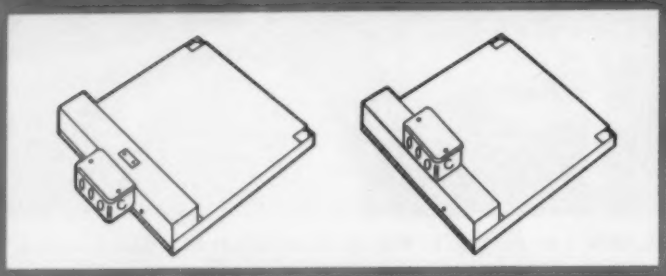


Fig. 3. Heaters are available with junction boxes in positions shown.

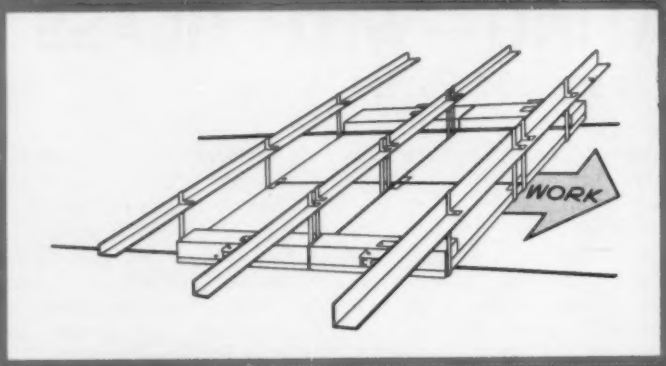


Fig. 4. Installation with two or more heaters located above the work.

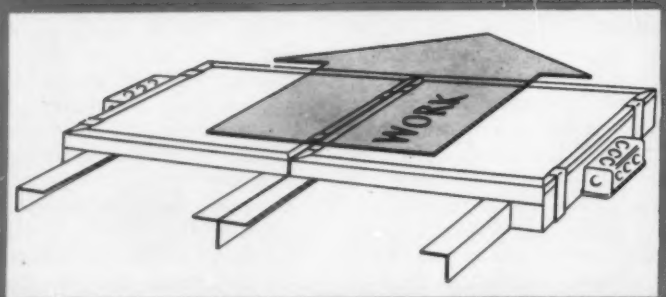


Fig. 5. Similar to above but here heaters are mounted below the work.

direct and more useful application of heat. The long wave length heat is neither reflected away from the product, nor does it shine through the product. Rather, it is absorbed by product.

An Alabama plant installed the heaters to stress-relieve vinyl floor tiles, found a startling power saving—about 75 per cent less than the previous cost of heating by a different method.

The company also noted faster processing with radiant heaters. It accomplished in 30 seconds what had previously taken two minutes to do.

A drug firm sign shop in Chicago reported an important time-saving following installation of the panels to dry silk-screened ink. Sixteen 16 by 24 in. panels were installed, using do-it-yourself type framing. Then, working with ink manufacturers, some modifications were made in inks used. Drying time was reduced from three minutes to 30 seconds.

In many operations space is at a premium. Manufacturers have reported that the radiant glass panels can do the job in a comparatively small area, permitting expanded operations without expensive additions to the physical plant.

Low cost of installation has proved an important advantage to users. The useful heat per kilowatt and resultant power savings often pay for an entire installation in a reasonably short period.

A southern plant utilizing 30 heaters to dry ink stenciled on tee shirts, reported the initial installation cost was "very low."

Reduction of product loss due to improper heating also is a significant factor in operational savings.

In stenciling the shirts, the plant uses many compositions of ink and many different colors. The inks must be thoroughly cured and dried without scorching the cloth. Since each color required a different degree of temperature, it posed a real problem.

Using quartz tubes for heating, the company depended on delicate temperature controls and the skill of its workers. Burning remained a constant threat, however.

Because the radiant glass heating panels are "color blind," the ticklish temperature control problem was eliminated. Color differential of product now makes little difference

—the heating speed remains the same.

Management concluded, in fact, that loss of one single order due to burned cloth paid for the cost of replacing the previous heating system.

Because the glass is an effective radiation emitter and the conducting film is a poor one, radiation leaving the glass surface is about twice that leaving the film surface. As noted, metal reflectors, as shown in Fig. 2, direct back to the film the rays leaving the film surface. Thus, approximately 85 per cent of the available heat is aimed at the work.

Heaters are connected to the electric circuit by means of the standard junction box which can be mounted in either of two positions, as shown in Fig. 3. Units are available with heating areas ranging from 11⅝ by 11⅝ in. (750 watts) to 23⅝ in. (3750 watts). Heaters usually are wired in parallel, on single phase 115 or 230-v circuits or on balanced 3-phase 230-v circuits.

Installation

Easily suspended modular units, the heaters can be combined to build up the desired heating. Thirty units were installed over a 48 in. stainless steel mesh conveyor belt to dry ink stenciled on tee shirts at the southern manufacturing plant.

A floor tile manufacturing plant combined four heaters with two 16 by 24 in. units to cover a 36-in. conveyor belt in stress relieving the vinyl tiles.

Heaters can be mounted in any position or combination of positions to provide an even over-all heat pattern. They can be placed above or below the work; mounted vertically, diagonally, or in a staggered position.

Maintenance

In all installations, maintenance has been reported to be a simple and low-cost proposition. Normally, only maintenance required is to keep the heater surface reasonably free of dirt. In most cases, an occasional wiping with a dry cloth is sufficient.

While excessive moisture on any part of the panel should be avoided, ordinary humidity from the drying operation itself is not harmful to the units. **End**

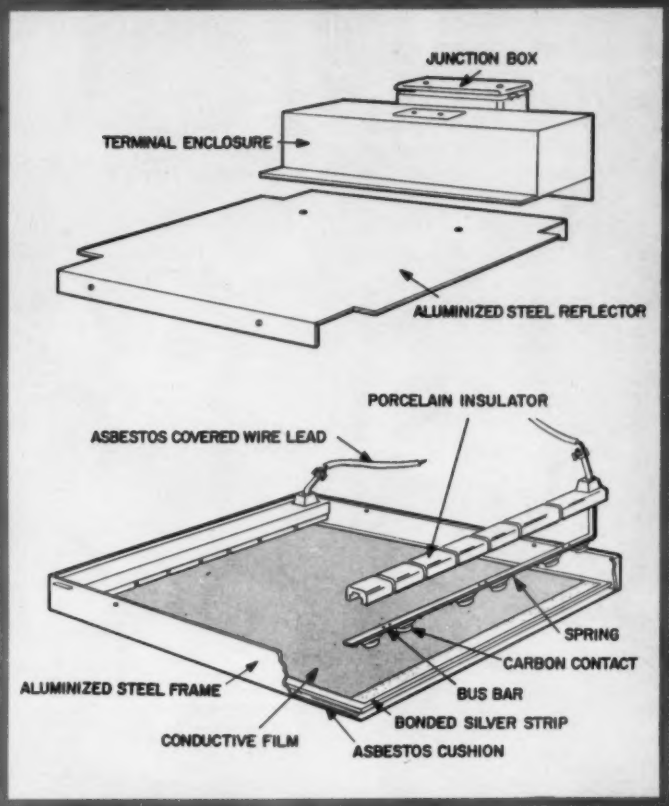


Fig. 6. Exploded view shows how various elements go together.

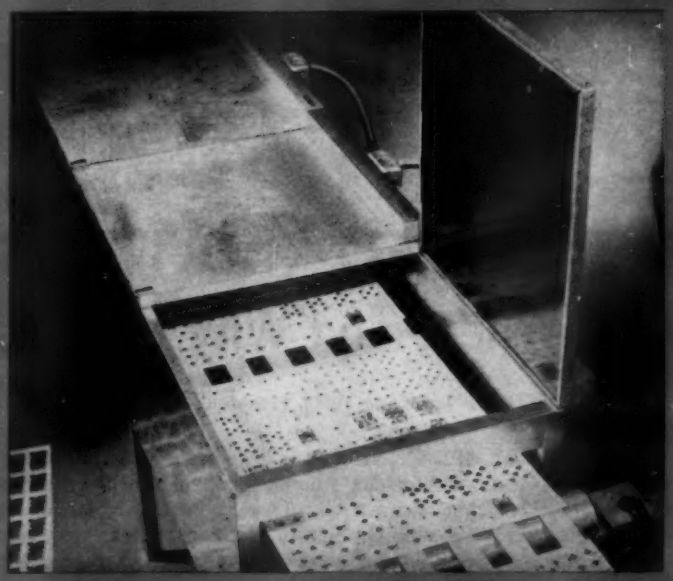


Fig. 7. One more example shows how heaters are used for drying cards.

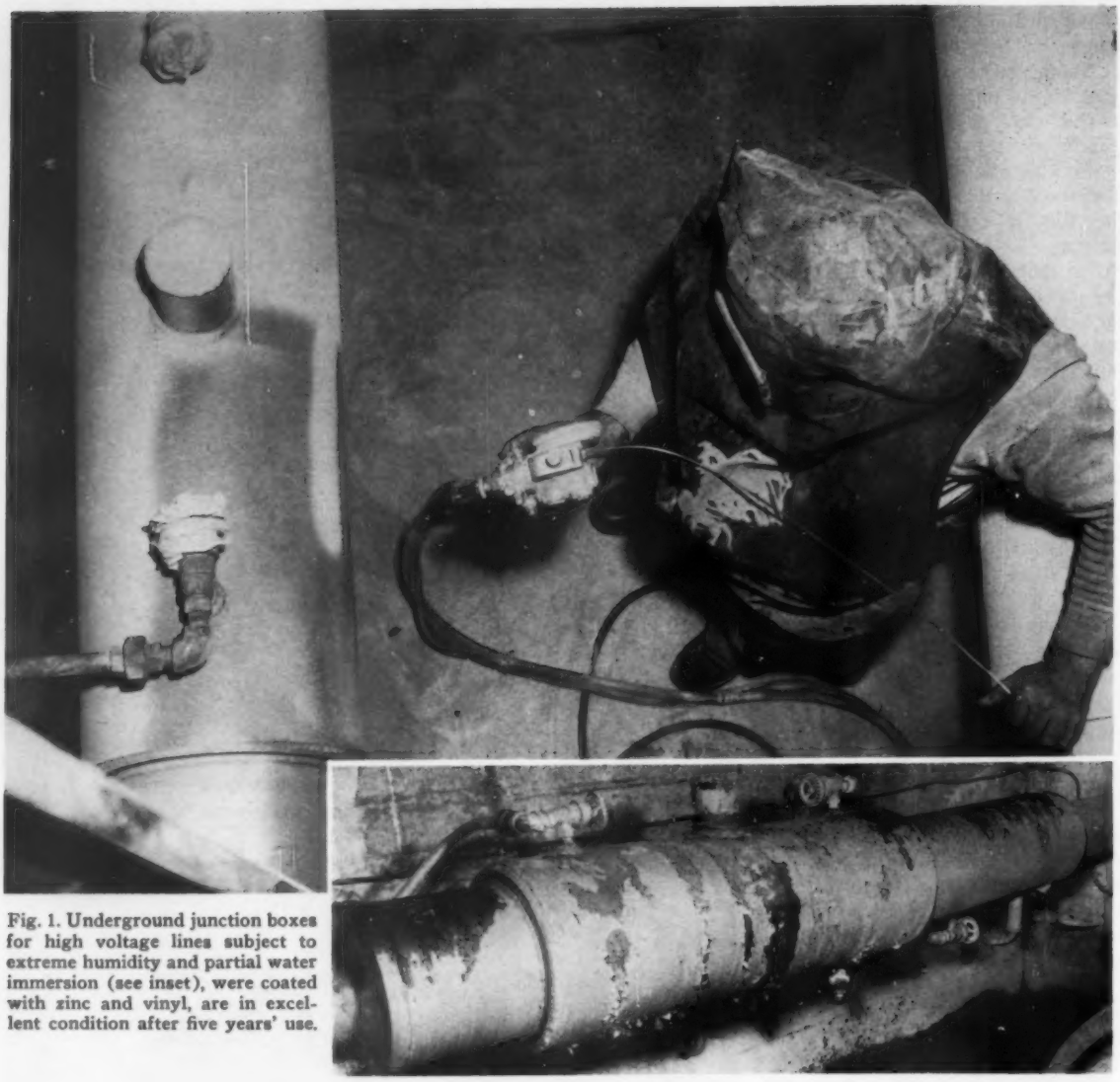


Fig. 1. Underground junction boxes for high voltage lines subject to extreme humidity and partial water immersion (see inset), were coated with zinc and vinyl, are in excellent condition after five years' use.

METALLIZED COATINGS

What, Where and Why of Uses and Applications

By S. JOHN OECHSLE, Jr., Exec. Vice President, Metalweld, Inc., Philadelphia, Pa.

USES OF METAL SPRAYING can be broken down into four major divisions: 1. machine element metallizing; 2. corrosion-contamination metallizing; 3. combination coatings; and 4. high temperature coatings. Each of these divisions will be considered in this article.

It is in the maintenance field that metallizing excels. Wear is a constant factor in machine operation and worn parts accelerate wear. With metallizing, these worn parts can be restored to their original size.

Applications include the metallizing of all types of shafts and bearing and gland surfaces of motors, generators, turbines, centrifugal pumps, machine tools, rods and similar objects. Pistons and hydraulic rams, crank shafts, printing cylinders, drying drums, paper making rolls, and many other pieces of machinery and equipment can be re-surfaced with various metals.

Production setups can be used

whereby metallizing is applied to conserve critical materials or to produce a hard wearing or heat-resisting surface. For example, metals like stainless steel, nickel, monel or aluminum can be sprayed on carbon steel in only those areas where it is desired.

Parts can be rebuilt with no excessive application of heat. Consequently, there is no danger of warpage or crystallization of base metal. A motor armature shaft, for instance, can be rebuilt with no damage to the windings. Cost of repair by metallizing is normally only a fraction of the replacement cost of the part or machine.

Cathodic Protection

In the second category of use, corrosion-contamination metallizing, metals such as zinc and aluminum, sprayed on steel structures to a thickness depending upon the service conditions, will afford cathodic protection and eliminate the possibility of iron oxide penetrating the barrier to contaminate the product. We have found an 8-10-mil thickness of sprayed zinc or aluminum offers continuous protection in certain environments with about 1 or 2 mil dissipation from the sprayed metal in an eight-year period, (see Fig. 3).

Excellent protection has been accomplished in storage tanks, shipping containers, barges and ship tanks, tank cars, and food handling equipment, and equipment for handling such varied products as sugar, liquid soap, glycerine, transparent lacquers, solvents, oils, metal products and neutral solutions.

Warm, fresh water only is required to clean the surfaces of the equipment and this has no detrimental effect on the sprayed metal coating even though the coating is porous. Cathodic action during cleaning prevents rust formation.

The surfaces of vessels which are used for one product service can be protected with metals such as nickel, tin or stainless steel. These metals form an inert barrier if the organic fluids to be protected from contamination have no oxidizing effect on either the base metal or the coating.

Even though the coating is porous, certain specific solutions will impregnate the coating and prevent contamination and iron pickup. This is true when there is no water present or when water or steam is not used in cleaning.

Sprayed Zinc, Aluminum

Some mention should be made of the application of bare sprayed metal coatings of zinc and aluminum for atmospheric and water corrosion. Specifically, a zinc coating applied to the interior surfaces of a particular water storage tank in 1934 cost approximately $1.00 per square foot. After some 22 years, the cost is approximately 4½ cents per square foot per year of protection afforded. It is estimated that at least half of the original thickness of zinc remains so that an additional 15 years of protection can be anticipated, and in the meantime there is no loss of steel in the tank.

In order to understand the combination coatings, we must look carefully at the components. First, the characteristics of the metal spray: the bond between the spray and the base metal is mechanical and its strength depends on the type of surface preparation and the type of metal to be used. The selection of the spray metal is of prime importance, for it must have maximum resistance to the proposed service conditions.

Choose Sealer With Care

The choice of the organic sealer is equally important. Through careful testing and elimination, the organic with maximum economical resistance should be chosen. There are many combinations available including a variety of base metals with sealers of the phenol, phenol-epoxy, epoxy and furane types, both baked and chemically converted.

There are specific methods by which complete impregnation is accomplished but a problem presents itself in the use of chemically converted materials. It is important to consider the converting agent. Whether the agent is acid or alkaline will determine its compatibility with the base metal.

There have been many successful applications in a wide range of situations. One such system is composed of sprayed nickel impregnated with a heat-cured phenol epoxy. The application is used in a process employing boiling hydrochloric acid contaminated with solvent.

In this application, a corroded tank was thoroughly blast cleaned and a 0.01-in. lining of nickel impregnated with a non-toxic, chemically converted, phenol epoxy resin was applied. This unit has operated for three years without any sign of failure.

Semi-chemical digesters for the pulp and paper industry have been metallized with stainless steel. In these, calcium sulphite is formed within the structure of the sprayed metal.

Aluminum and zinc coatings, which are anodic to steel, are the only practical metals available for metallizing that will protect steel cathodically. They are sacrificial coatings and their life or usefulness depends upon their environment.

Sprayed coatings of these two

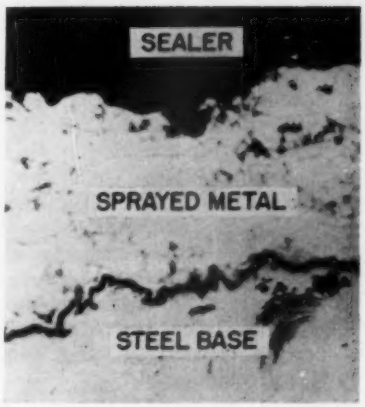


Fig. 2. Porosity of metallized coating increases adhesion of the sealing coat.

metals are sometimes impregnated with a suitable resin in order to:

1. extend service life by reducing dissipation;
2. enhance the appearance;
3. perform a combination of 1 and 2.

Some years ago an eastern utility company realized that its underground junction boxes for high voltage lines were corroding severely. All standard paint systems failed in less than one year because of the extreme humidity and partial immersion during heavy rain.

Several locations were chosen in May 1951 and an experimental

coating of zinc and a vinyl system was applied. After five and one-half years had passed the original units were still in excellent condition with no visible breakdown in the system, (see Fig. 1).

Four years ago, an oil company on the east coast had a severe problem of corrosion on its floating roof tank shell plates. Several methods of protection were tried including the use of inhibitors. None was completely satisfactory.

An experiment was made to determine if metallizing would solve the problem and, if so, what system was best. The entire tank shell was divided into five sections and on each section a different coating was applied: 1. zinc only; 2. zinc and saran plastic; 3. zinc and vinyl plastic; 4. aluminum and saran plastic; and 5. aluminum and vinyl plastic, see Fig. 4.

At the present time the four combination coatings are affording excellent protection. The zinc applied on the first section has almost dissipated, probably because air in the area is polluted with acid. Additional time will be required to give conclusive results on other sections.

Metallized coatings are porous and the porosity greatly increases the adhesion of a coating applied over the sprayed metal. The thinned organic coatings soak into the sprayed metal as into a blotter and anchor themselves permanently to the surface. By their use, the three primary causes for coating failure —loss of adhesion, underfilm corrosion, and osmotic blistering, can be virtually eliminated.

Combination Coatings

Vinyls, furanes, phenolics, epoxies, silicones, neoprene and chlorinated rubbers have been used successfully as sealers over sprayed metal, as well as air-dried, catalyzed or baked coatings.

Sprayed metal coatings with organic sealers can be applied to bridges, vessels, tanks of all kinds, steel pilings, ship hulls, superstructures and interior equipment, refrigeration equipment, underground conduits and fabricated steel. These coatings provide low yearly cost protection against severe industrial, rural, water (salt and fresh), and mild corrosive atmospheres.

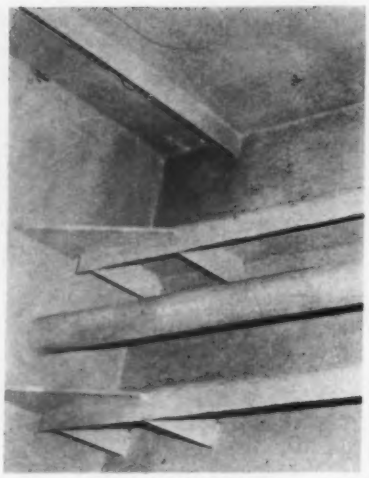


Fig. 3. Zinc or aluminum sprayed on steel affords good cathodic protection.

Advantages of the combination coating systems are: 1. increased corrosion protection; 2. increased life expectancy of the lining by reason of its double protection; 3. better resistance to mechanical damage. (Abrasion of the organic coating would still leave the protection of the impregnated sprayed metal.); 4. higher temperature resistance; 5. low cost of construction material: for instance, stainless steel or nickel metallizing in place of an all-stainless steel or nickel tank.

High Temp Applications

For high-temperature metallizing, three processes can be used. All three prevent heat corrosion caused by the action of hot gases on iron, steel or copper-nickel alloy parts. The processes consist of thin coatings applied by metallizing.

The first involves the application of a sprayed aluminum coating, the addition of a special paint-type sealer and the subsequent heat treatment of the coated part. In this case, protection against heat corrosion is provided by the absorption of aluminum into the surface. The coating can be used in applications where temperatures range up to 1800 F.

Another process consists of a thin layer of sprayed nickel-chromium applied to an iron or steel part, a very thin layer of sprayed aluminum applied to the nickel-chromium coating, and finally a special paint-type sealer applied on the outside. No heat treatment is necessary before the part is put into service.

When first heated, the aluminum melts and is absorbed rapidly into the porous, sponge-like structure of the sprayed nickel-chromium alloy This can be used in applications requiring temperatures up to 2000 F and where sulfur gases are encountered.

For Less Severe Jobs

Third process is based on the same principle as the second, but much less aluminum is used—it is applied as a powder mixed with a special paint-type sealer. In this process, the only metal spray is the nickel-chromium alloy. No special heat treatment is necessary.

This process is less expensive than the other two and it is satisfactory for all but the severest applications. Because it has much less aluminum oxide on the outside however, it is not recommended where sulfur gases are an important factor in corrosion. It can be used for a temperature range up to 1800 F where sulfur gases are not present.

Use of sprayed coatings is being extended by new developments in alloy and ceramic powders. These materials find service against wear, corrosion, and heat.

Powder guns developed for the spraying of alloy and ceramic have corrected many of the earlier problems connected with spraying these coatings. Deposit efficiency is now more than 90 per cent and sufficient heat can be provided for spraying the high-melting-point materials like alumina and zirconia.

There are three basic groups into which materials can be divided when used in a powder gun:

1. Self-fluxing alloys: Usually, but not always, fused after spraying. The term self-fluxing is used to describe alloys to which fluxing agents have already been added. The fluxing elements commonly used with nickel-based alloys are boron and silicon. The borosilicate which results from the fusing operation dissolves oxides of iron, nickel and chromium and promotes wetting and fusing of metal particles to each other and to the base.

The amount of boron and silicon must be carefully controlled in these alloys since their physical properties

depend to a critical extent on the boron-silicon content. Alloys of this type range in hardness from Rockwell C-30 to C-65, possess excellent resistance to corrosion and heat oxidation, have a very low coefficient of friction and resist wear and abrasion to a much greater extent than most other alloys of equal or greater hardness.

2. Oxidation-resistant alloys: Not fused after spraying. They are designed to resist the formation of oxide without the addition of self-fluxing agents. If materials which do not resist oxidation are used in the powder process, oxides form and are incorporated in the coatings to an objectionable degree.

Oxidation-resistant alloys of this group include stainless steel, high chromium stainless steel and a chromium-nickel alloy which has very high corrosion resistant properties.

This group of metals has superior physical properties when applied with the powder gun, using fine powders and hydrogen as fuel gas. The coatings are finer and denser than can be obtained with the wire process.

3. Ceramics: Examples are zirconia-and-alumina-based materials especially processed and graded for use as abrasion-resistant thermal insulators. These have already been difficult to spray, due to their high melting point and low heat conductivity.

When conventional powder guns using compressed air have been used for spraying ceramics, the cooling effect of the air has seriously reduced the thermal efficiency with resulting poor deposit efficiency.

Ceramics Available

There are two ceramic materials available at the present time, alumina-base and zirconia-base powder. Zirconia-base coatings have the highest heat insulating value while alumina-base coatings, though somewhat less effective as heat barriers, are harder and possess greater strength. Both of these materials, however, have very high thermal barrier properties as compared with other metals or cermets.

These coatings are usually applied in thicknesses from 5 to 25 mils depending upon their intended use. They have good resistance to thermal shock and are resistant to many types of abrasion at temperatures in excess of 3400 F.

One interesting aspect of the powder spray system is that it can be combined in forms using the third metallizing process mentioned, followed by thermo-sprayed alumina. This type of combination shows promise from a standpoint of adequate service life as well as reduced over-all cost of production.

Surface Preparation

Probably the most important single factor determining the life of a sprayed lining is the surface preparation of the base material. There are two phases to consider in surface preparation. First, the degree of surface cleaning and second, the degree of surface etch. The degree of cleaning cannot be compromised. It is an accepted industry standard that only an SSPC #5 white metal blast will do.

The depth of etch for normal resin coating should not exceed one-third of the total film thickness. In the case of metal spraying, a heavy etch is advantageous. The bond between base and spray is mechanical and a heavy etch will increase the bond characteristics.

For metal spraying we generally use one of three types of abrasive: Natural silica sand. This material has several disadvantages. It may lack angularity and may contain friable alkaline constituents which would break up and cling to the surface.

Crushed chat: This material has excellent angularity but it is important to watch the source of supply. Some very high purity types will leave considerable material imbedded in the surface.

Angular steel grit: This material is used only where recovery is possible. It has excellent angularity and leaves the surface clean.

In the application of linings there are four elementary and basic steps which should be followed: 1. program; 2. organization; 3. material; and 4. application specifications.

A program including a reference library, specifications, inspection and installation records is of the utmost importance. To service this program, a corrosion engineer should be employed. An extremely important phase in the whole operation is a comprehensive set of application specifications which will serve to standardize bidding and give an inspection yardstick.

The bidding is basic; the inspection yardstick tells the applicator what to expect and gives the owners instructions needed to insure standard quality.

There are usually two parts to the specifications. The first could be called general, which includes an over-all scope of intent, instructions to bidders, insurance requirements, performance bond, company restrictions and safety requirements. This section varies with every company. Specifications should include those instructions and restrictions of purchasing, operating and legal departments. Second part of the specifications covers the actual coating application. **End**

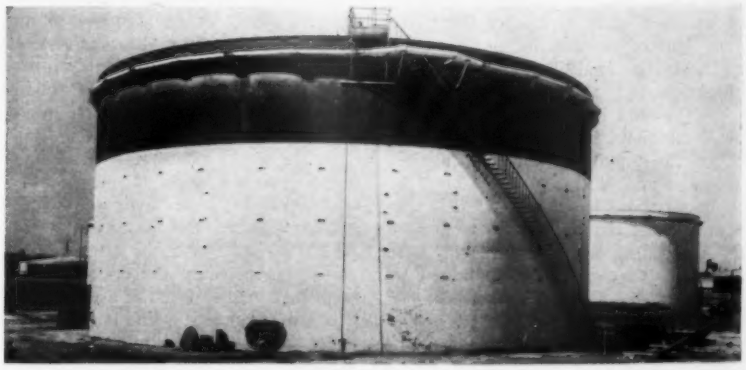


Fig. 4. Five different coatings were tested for durability on sections of this tank.

STAINLESS PIPING—

What Thickness? What Analysis? What Price?

By JACK RECKARD, Speedline Division, Horace T. Potts Co.

IN DESIGNING corrosion resistant stainless steel pipe lines there are two factors dominating one's choice of stainless analysis and pipe wall thickness.

1. Pressure is balanced against pipe wall thickness.
2. Corrodent is balanced against material analysis.

In this connection we feel it is logical to state that 90 per cent or more of all piping applications will have pressures that could be contained by pipe designed for 150 psi service.

Characteristics of Stainless

Formed Steel Tube Institute Handbook has listed the bursting pressures of various thicknesses or "Schedules" of stainless steel pipes. A sample of some of the figures is shown in Table I. The fibre stress used for stainless steel in computing these bursting pressures was 85,000 psi. Room temperature is assumed.

In the American Standard Code for Pressure Piping and ASTM specs covering austenitic stainless pipe, the section covering hydrostatic testing refers to Barlow's formula with the further stipulation that a fibre stress of 15,000 psi must be used. In no case need the hydrostatic test exceed 2500 psi for 3 in. and smaller or 2800 psi for larger than 3 in.

Table II presents hydrostatic test pressure requirements for the same selection of sizes.

Even the stringent ASA Pressure Piping Code states that the maximum hydrostatic test which a piping system need be able to withstand after erection is only one and one-half times the *design* pressure.

If we are correct in our assumption that 90 per cent of stainless piping will be used in 150 psi service or less, it is equally true that these low pressures wholly justify the use of Schedule 5's—at least up to and including 4 in. pipe size.

In the worst example, 4 in. Schedule 5 stainless pipe is designed to withstand 555 psi hydrostatic test pressure under the requirements of ASTM A-312. With our assumed 150 psi design pressure the code requirements of ASA—B 31.1 are satisfied if a 4 in. Schedule 5 line is hydrostatically tested to withstand only 225 psi pressure.

We think this is impressive evidence in favor of broader use of the light wall stainless pipes—for example, Schedules 5 and 10.

The factor of corrosion in piping customarily leads to use of ever-heavier walls. More "kind vs kind" investigations are in order so that the piping materials used will be more resistant to attack by any particular corrodent.

Light Wall's Advantages

A change to light wall pipe made of more costly metal in place of piping made with cheaper steels, necessitating heavy walls and much maintenance, can result in actual dollars and cents savings over the life of the piping installation.

A change in analysis with less wall thickness may be an economic advantage over increased wall thickness in the same analysis.

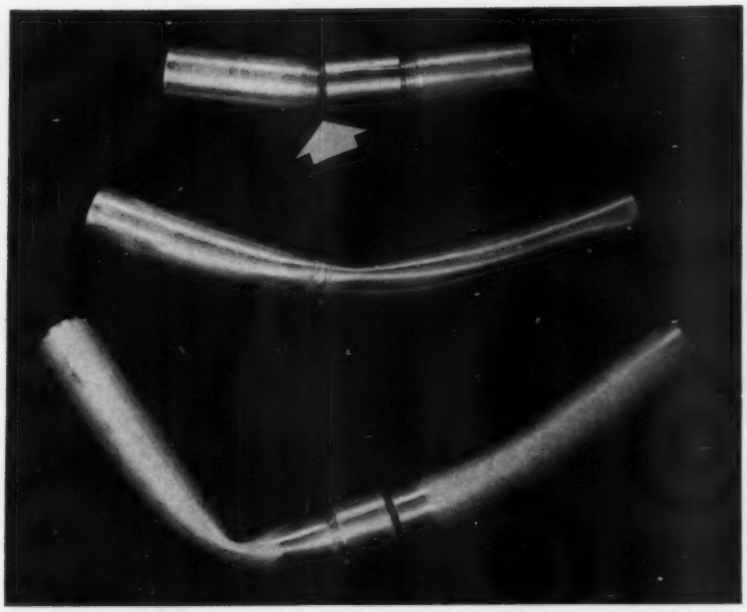
For example it wasn't too long ago,

Table I. Bursting pressures of two sizes of stainless piping in three analyses.

Type of Pipe	Bursting Pressure	Factor of Safety in 150 lb Service
1 in. Schedule 40 Stainless Pipe	15,170 psi	100 to 1
1 in. Schedule 10 Stainless Pipe	12,415 psi	83 to 1
1 in. Schedule 5 Stainless Pipe	7,420 psi	50 to 1
4 in. Schedule 40 Stainless Pipe	7,900 psi	50 to 1
4 in. Schedule 10 Stainless Pipe	4,000 psi	26 to 1
4 in. Schedule 5 Stainless Pipe	2,765 psi	18 to 1

Table II. Hydrostatic test pressure requirements for piping shown in Table I.

Type of Pipe	Hydrostatic Test Pressure Required by ASA and ASTM
1 in. Schedule 40 Stainless Pipe	2,500 psi
1 in. Schedule 10 Stainless Pipe	2,500 psi
1 in. Schedule 5 Stainless Pipe	1,485 psi
4 in. Schedule 40 Stainless Pipe	1,580 psi
4 in. Schedule 10 Stainless Pipe	800 psi
4 in. Schedule 5 Stainless Pipe	555 psi



Threaded 1 in. Schedule 40 pipe was broken at threaded connection simply by standing on it, says the author. The socket welded and butt welded joints were placed in a 100 ton press; pipe collapsed, as shown, but did not rupture.

in the paper industry, that double extra heavy carbon steel pipe was used. This pipe had a life expectancy of 18 months to two years in some pulp lines. Maintenance crews of generous proportions were constantly on the alert for trouble where erosion and corrosion caused difficulties.

Considering stainless steel as a replacement for double extra heavy carbon pipe on an equivalent wall thickness basis was out of the question with the then existing 10 to 1 ratio of initial cost.

However, the light wall stainless pipes have made this ratio only 2 or 3 to 1 and produced a life expectancy of 5 to 10 years with resultant reduction in maintenance costs.

Another "kind vs kind" comparison can be made when considering the substitution of a richer stainless analysis for one which is being attacked. This too, will show that Schedule 5's or 10's allow use of more costly alloys where the heavy wall pipes of lower grade alloy are causing trouble.

A good example which is finding increasing favor as time goes on is the substitution of FA 20 pipe for Type 316 as shown in Table III.

The richer alloy Schedule 40, Type 316, when substituted for Schedule 40, Type FA 20, is prohibitive compared with buying heavier wall Schedule 80 in Type 316. It is easy to justify the Schedule 5 in FA 20.

So long as the pressure can be contained by the wall of the lighter wall pipe it is sound economy to buy sufficient wall to hold pressure in the *correct* material. Buy all the wall thickness you need—but don't buy more than you need.

This is not a dogmatic approach. There are cases where buying thicker material adds economic life to installations. In the general category of corrosion, however, with all of its many facets, it is safe to say that buying twice the wall does not always guarantee twice the life.

In addition to the tremendous advantage of lower first cost, there are other more subtle benefits which accrue to the user of light wall pipes. These added benefits enhance the quality of the piping installation as well as offering additional opportunities for savings of time and money as shown below.

The most obvious of these is to examine the common use of Schedule 40 pipe when threaded and connected with screwed fittings.

If a low pressure line is to be installed, the purchase of pipe in Schedule 40 wall, just so the ends can be threaded, seems a gross waste of dollars and cents, since approximately one-half the wall you purchase is cut away by the threading operation.

When you consider that the same generally *effective* wall can be retained by use of Schedule 5 or Schedule 10, it seems ridiculous to purchase Schedule 40. Comparisons are shown in Table IV.

Further than this the notch of threads in the Schedule 40 pipe presents the paradox of the heavier wall material, which cost much more, producing by far the weaker joint structurally.

Another disadvantage to threaded joints is the time required to go back over the joints to stop leaks. Sometimes even strenuous efforts at tightening are to no avail.

Stainless lines of Schedule 40 with screwed fittings that have subsequently been back welded to make them leak-proof are good examples of poor installation. This happens more times than you would believe. Just butt welding or brazing of Schedule 40 would have been more economical.

I suggest a close analysis comparing *all* costs—materials, labor, downtime, rechecking and reworking of screwed lines—versus a light wall line. **End**

Table III. Comparative prices of four different types of stainless steel pipe.

100 ft 2 in. Schedule 40 Type 316 to ASTM A-312	$ 651.54
100 ft 2 in. Schedule 80 Type 316 to ASTM A-312	1280.53
100 ft 2 in. Schedule 40 FA 20 Pipe to ASTM A-312	1630.44
100 ft 2 in. Schedule 5 FA 20 Pipe to ASTM A-312	902.50

Table IV. Wall thickness of threaded Schedule 40 pipe compared with thin wall.

Size, Inches	Sched. 40 Effective Wall After Threading	Sched. 5 Wall	Sched. 10 Wall
1/2	0.052	0.065	0.083
3/4	0.056	0.065	0.083
1	0.064	0.065	0.109
1 1/4	0.071	0.065	0.109
1 1/2	0.076	0.065	0.109
2	0.085	0.065	0.109
3	0.116	0.083	0.120
4	0.137	0.083	0.120

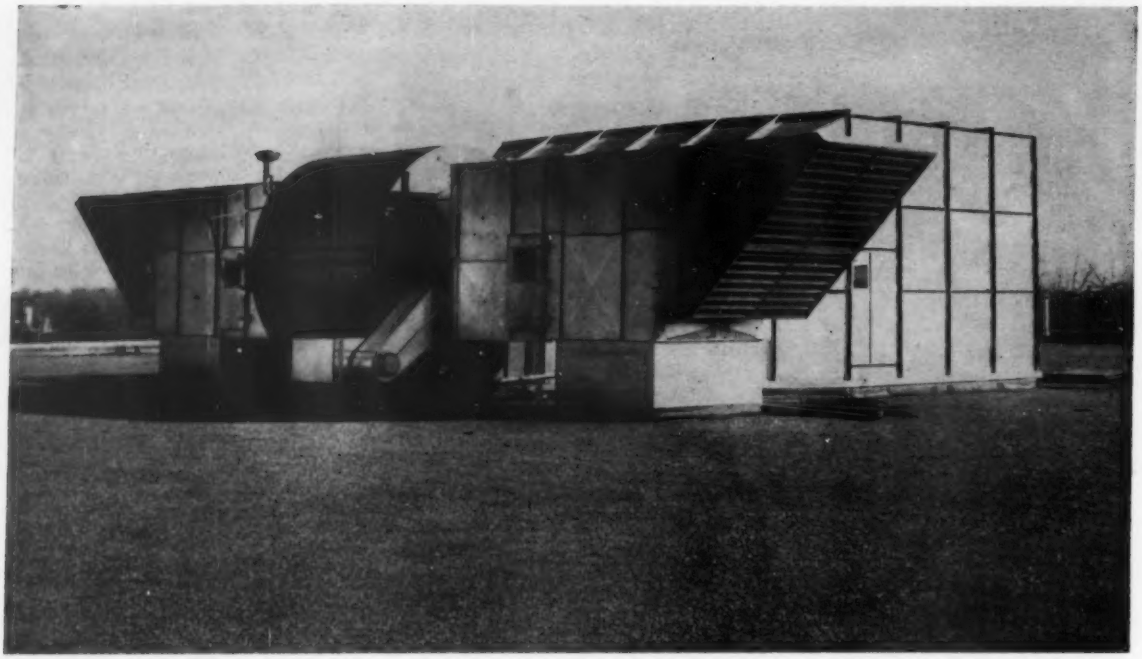


Fig. 1. Roof fan which discharges air into penthouse has two inlets, each connected to return and outside air openings.

ROOFTOP AIR CONDITIONING
Flow Goes From Penthouse Down Into Plant

By RAY T. JOENS, Plant Engineer, Fisher Governor Co., Marshalltown, Iowa, and
WILLIAM E. NANNES, Consulting Engineer, Des Moines, Iowa

IN PLACE OF a conventional way of heating, ventilating and cooling manufacturing space, the Fisher Governor plant at Marshalltown, Iowa has a central system with roof-mounted equipment. In this system are employed a penthouse, a large fan and a coil chamber with hot and cold decks. Installing this "one-unit" arrangement has resulted in a one-third saving.

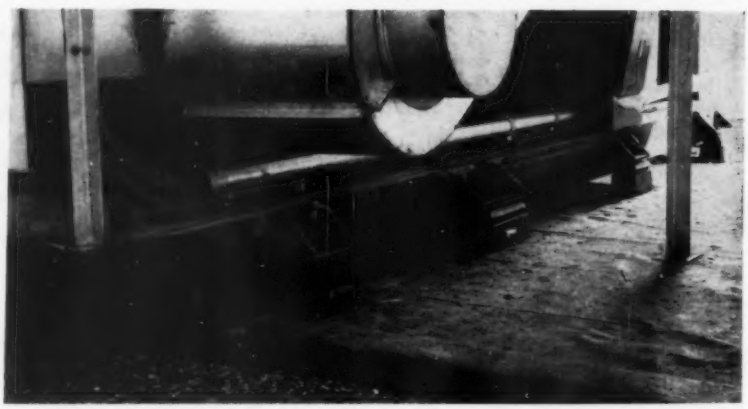
Preliminary plans for the addition of 120,000 sq ft of floor space had already been undertaken when the heating, cooling, and ventilating question came up for consideration. In an effort to save money, an attempt was made to devise an unusual method to handle the problem. To provide a system as efficient as possible was another goal.

Several factors had to be considered before the problem could be pronounced solved. These were:

1. A single air handling unit capable of moving 120,000 cfm without undue vibration or noise.
2. Some sort of air intake and recirculating system, heating and cooling coils and duct work.
3. An area in which to place the various pieces of equipment without interfering with other plant activities.

The first of these requirements was met by a statically and dynamically balanced Chicago Blower fan

Fig. 2. Platform on which the fan rests is mounted on 12 vibration isolators.



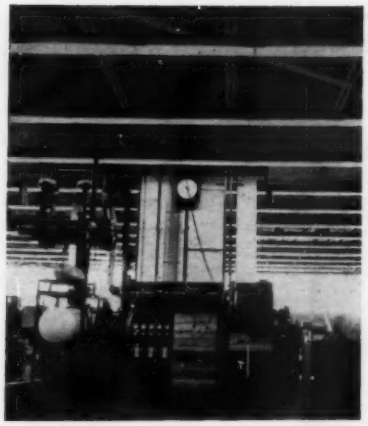


Fig. 3. Air supply ducts are grouped. System heating exchanger is at left.

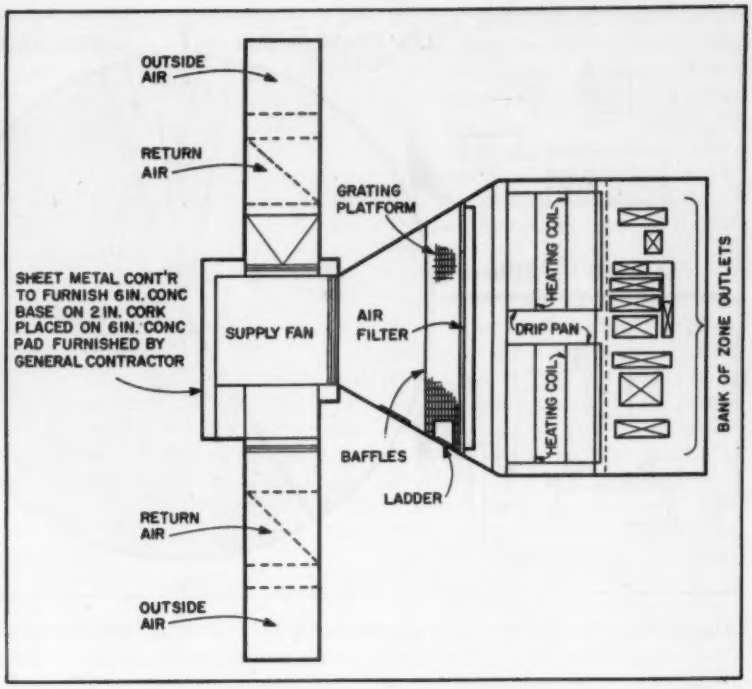


Fig. 4. Cooling coils, not shown in sketch, are located under heating units.

which has a wheel diameter of 78¾ in. The fan's airfoil blade design has a mechanical efficiency in excess of 90 per cent.

We had decided on what type of roof we wanted for the addition before considering the heating and ventilating equipment. The roof support consisted of jack trusses and 50-ft long spans carried on steel columns. We decided that with some reinforcement, the jack trusses and long spans would be adequate support for the fan and other equipment. See Fig. 5.

Roof Reinforcing Needed

While we knew the fan would operate with minimum vibration, we also knew that with the total weight of the equipment on the roof, it would be necessary to strengthen the roof.

To form a base, a 6-in.-thick slab was poured over a 16 by 12-ft area at the center of the rectangular shaped roof. To give additional support, we inserted 6 by 4-in. angle iron just beneath the roof and between the long spans. The jack trusses and long span members were reinforced with additional cross members. In all we strengthened a 50 by 50-ft area of the roof beneath the concrete slab. Columns in this area were made heavier to support the additional load.

Next, a second 6-in. concrete slab was poured on steel framework supported by 12 vibration isolating mounts on the concrete roof slab. See Fig. 2. On the second slab the fan and its 75-hp motor were mounted. We then proceeded to build our metal penthouse.

At each of the fan's two air inlets, we provisioned for a square sheet metal housing to contain outside air and return air mixing dampers. The fan was delivered with automatically controlled inlet vanes which vary the amount of total air handled as conditions change.

At the fan's outlet a sheet metal chamber was constructed to contain the hot and cold deck coils. The coil chamber itself is 19 ft high, 26 ft, 8 in. wide and 15 ft long.

The air distribution system is zoned to handle interior areas and areas affected by exterior walls. All of the air is filtered through an automatic roll type blanket filter.

For summertime cooling, we made use of the fact that the plant is situated above an easily accessible well. Water pumped from this well arrives at the surface at approximately 52 F. It is then piped to the cold deck in the penthouse and used for cooling. In warm weather the air conditioning system uses 90 gpm of this water to cool the plant a minimum of 10 deg F. **End.**

Fig. 5. Trusses and roof under installation were reinforced. Note angle iron.

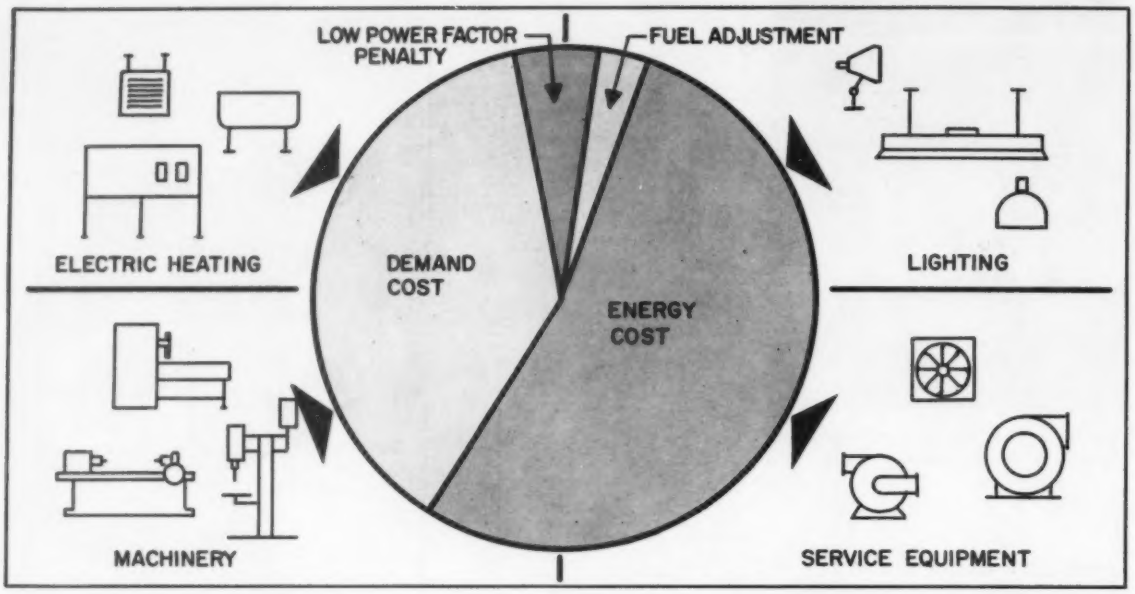


Fig. 1. Showing the components of your power bill in graphic form helps others understand the need for careful control.

HOW TO CUT YOUR POWER BILL

Planned Campaign Makes a Big Difference

IF YOU BELIEVE that your electric bill covers the power used in your plant during the past month, you are only partly correct. There are several factors included that seriously affect the amount of your bill besides power utilization. In general, your power bill will also include charges for demand, power factor and may include a factor to account for the variable costs of fuel used to generate electricity, Fig. 1.

Each power company has a different method of billing. The wording may be different and the rates calculated in many ways but all of the above factors are included in every bill with the possible exception of the fuel adjustment. If you are buying hydro-power you probably will not have this charge.

Electric power is easy to use. Turn a switch and a thousand horsepower springs into action or a whole building is lighted. Electricity is so handy and so easy to control that it is easily wasted. Unless every kilowatt hour of energy and every kilowatt of demand is efficiently used, the cost of this waste is as real to a plant's operation as the scrap made by any machine tool.

Electrical waste is harder to detect than scrap from a machine tool. It shows up on the meter, of course, but the effects are felt only once a month when the bill arrives. By that time, the wastes cannot be traced back, and in too many plants are forgotten and accepted as a necessary evil. The alert plant engineer, however, wages a battle against waste power every day of the month. Here are a few suggestions which will help in this battle.

A demand charge will never turn your motors or light your office. It is a charge based on how you use power, particularly how much power you use in a certain time interval usually 15 or 30 minutes. The amount you pay is based on the highest amount of power used in any one interval or it may be averaged over three or four intervals. In either case, you are paying a premium based on a very small operating time of your plant and there is no way of reducing this charge once it is established in a given month.

Cost of demand kilowatts is high and may run all the way from $1.05 to $2.00 per kw. As a rule, this is the area of largest savings in power bills, but you don't just snap your fingers and see spectacular results. A demand reduction campaign must be carefully planned and followed through.

A peak demand registered during a single 30 minute period may establish the demand cost for the entire month and in some schedules for the full year. As demand costs add nothing to the product you would think that only enough demand kw would be purchased to properly operate the plant. Unfortunately, this is seldom true as

shown in a typical daily maximum demand curve, Fig. 2. Here a peak demand of 1000 kw was set at 10 o'clock in the morning. Note large waste areas on this chart indicating poor use of purchased demand.

Demand reduction can be accomplished by moving some of the loads operating from 8 a.m. to 12 noon into the 12 midnight to 8 a.m. area. If this can be done without interfering with production you may find a curve more like Fig. 3. At $1.20 per kw, the 200 kw savings in demand is worth $240 a month or $2880 per year.

Even this worthwhile improvement leaves large areas of wasted demand in the early morning hours. If production scheduling permits, additional loads can be shifted to this time of day to reduce maximum demand another 100 kw. This would be worth an additional $1440 per year for a total savings of $4320 per year.

Few plants can move loads around the clock to obtain demand savings of this magnitude but all plants can make some improvements by careful examination of their critical demand periods and questioning each load on the line during that period.

You can readily determine how efficiently you are using demand kw purchased in your plant in the following manner. Let us suppose that your plant has registered a demand of 100 kw. If we assume 30 days in the month and 24 hours a day we will have 720 hours use of this demand. Now if we used the 100 kw demand at 100 per cent efficiency it means that we will use 100 kw for every hour of the day and every day of the month. If this were true, our kwhr consumption would be 100 kw times 720 hours or 72,000 kw hrs for the month.

Unfortunately, few plants can obtain 100 per cent efficiency in the use of demand. This is due to the very light loads usually carried over Saturday and Sunday and in the early morning hours during the week.

How efficiently is your plant using demand? If you will take your kwhr consumption for last month and divide it by your demand times 720 you will discover that it can be quite low. If your answer comes out to 0.50 you are no worse than most plants.

Many plant engineers ask, "What maximum demand should we register in our plants?" If you will take your kwhr consumption and divide it by 720 you will find the demand you will have to register to obtain 100 per cent efficiency in the use of demand kw. As an example, a plant with a demand of 1000 kw registers 450,000 kw hrs. Dividing 450,000 by 720 leaves 625 which is the kw demand for 100 per cent efficiency. On this basis, this plant is wasting 375 kw of demand and at $1.20 per kw is allowing $450 per month or $5400 a year to go down the drain.

Actually, this plant is operating with a demand efficiency of 62½ per cent which is probably higher than most plants. However, knowing the actual value of wasted demand gives everyone in the plant operating group a better understanding of how serious this problem can be. Monthly reports to general management on the value of wasted demand can help to obtain the cooperation needed for a successful demand reduction program.

The only people who can reduce demand charges are the ones who cause excessive demands. The greater part of these people are unaware of the waste they are causing by their unrestrained use of power. Therefore, any power reduction campaign must include an educational program to all supervision.

Before meetings are held with supervision, the plant engineering department must have the following information at their fingertips. Load curves showing a 24-hour operation of the day of maximum demand, a composite curve which is a curve drawn by computing the average of each period of demand for every work day in the month, a list of all major loads in the plant and how and when they are in operation, a list of all lighting loads in the plant, sample bill showing methods of billing, and sample of bills using the current bill as a norm and the others showing savings which can be made by reducing the demand.

With this information, you are now ready to fire the first shot in your campaign. Get the blessing of general management and call a meeting of all department heads. Explain your project, how they can

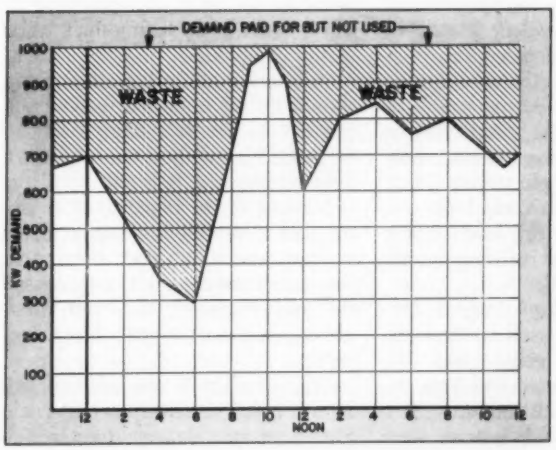


Fig. 2 Plot your maximum demand intervals for the day of maximum billing demand to show how money is wasted.

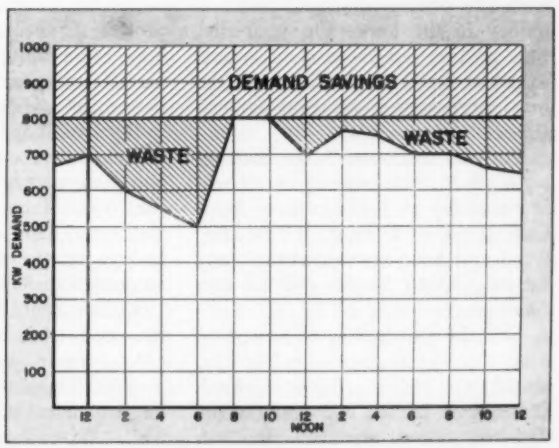


Fig. 3. Controlling demand for just two hours per day can reduce demand 200 kw and save as much as $2880 per year.

help, and approximately how much each can contribute in the final reduction.

A note of caution right now. At no time create the impression that your program will in any way interfere with production. All you are asking is for cooperation in scheduling work to reduce demand. It is foolish to save $100 in demand and lose $1000 in production. Management wants both the savings and the production.

After you have put your program over to the department heads at this first meeting, you are ready to go to work. This means getting down to the assistant department heads and the line foremen. These are the men who will make or break any power reduction program. They must be sold all the way. It is cost reduction, the same as any work simplification or methods improvement program with which they are familiar, only this program will be easier. All that is required is a little vigilance and willingness to get a job done. Be sure they understand that general management is interested.

Offer to run tests in their individual departments to establish machine loads. The use of recorders at strategic points may bring to light other interesting manufacturing details besides power checks. Productive output of machines may be increased in some cases without any danger to the electrical equipment. These are a bonus to the load survey. You will know you are a success when you are invited to conduct tests by other supervisors.

Every kw of load that is removed from the periods of top demand is money in the bank. On your first time around the program, it is best to get at the larger loads to get the maximum savings as soon as possible.

Furnace loads are large demand users. A furnace coming up to heat is operating at 100 per cent load. Once it is in control, the loading for a half hour demand period may be only 25 to 50 per cent of that amount.

Get the production arranged so that the furnace goes on the line during the period of low demand. Your load charts will show when the best periods are available. Shift changes and lunch periods are good times to have such loads go on the line. Staggering furnace loading is another good demand saver.

Large motor loads can sometimes be staggered over the three shifts so as to make the demand much lower. Rolling mill operations should be staggered to avoid two large loads on the line at the same time. One large plant in the middle west has three such large mills. All three mills on the line at one time could increase the power demand charge by $6000 a month. By working one mill on each of the three shifts, the same production gets out and the $72,000 a year is clear profit as far as power charges go.

Sometimes you have to spend money to make money. That is not unusual in manufacturing plants. A large aluminum extrusion plant used 1000-hp motors to drive hydraulic pumps. Three of these units were always on the line to assure ample power to the hydraulic presses. A careful survey revealed that three units were only required for relatively short periods of time during the entire 24-hour period.

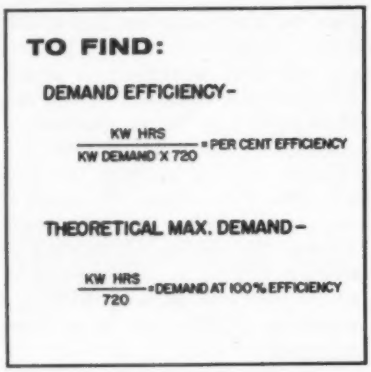

TO FIND:
DEMAND EFFICIENCY-
KW HRS / KW DEMAND X 720 = PER CENT EFFICIENCY
THEORETICAL MAX. DEMAND-
KW HRS / 720 = DEMAND AT 100% EFFICIENCY

Fig. 4. Check demand efficiency each month to maintain previous savings.

By installing the proper automatic control costing $1500, only two pumps were used during 23 of the 24 hours, and at times, only one unit safely carried the load. Power savings at the end of one month amounted to $2300.

In this same plant, large induction heaters were used to heat the billets prior to going into the presses. These units could heat the largest billet in 20 minutes, yet, while die changes or repairs were made to the huge presses, the billet heaters were left on continuously for periods lasting up to eight hours. The ratings of these units were 1500 kva, and there were three for each of the two presses.

When this was called to the attention of operation, they claimed the heaters had to be left on due to positioning of the billet to the control thermocouple. They were right, but a few minor changes to the material handling systems corrected that trouble, and the plant pocketed the savings.

Whole departments can sometimes be shifted without reducing production. While it is best to let shift operation alone, don't overlook the possibility for saving here, especially if you have off-peak clauses in your contract.

Pumping water to fill reservoirs or for cleaning and filtering of liquids can be done on off shifts to cut down day demand. Filling bunkers with coal and ash removal can be done at night as easily as during the day when demand charges are heavy.

Again, it is a matter of checking operations to see if any of the above work can be handled with economy. Most labor contracts now have a night premium on wages. This additional charge must be figured in any cost reduction. A simple rule to follow is to investigate those electrical loads where the kw per man is high. These fields will reduce friction from labor groups and offer the largest savings.

The control of demand can best be accomplished by using a load dispatcher. He is an individual who has control over all electrical loads of 100 hp and up. This man should never be set up as a power czar to run production by telling them when to run equipment.

A clearing house for information should be set up where production can call to see if a large load can be started up without causing extra demand charges. It is still up to the supervisor of the department to determine if production requirements warrant the extra cost but, come the end of the month, if they caused the extra demand, they had better have an answer for general management.

If your plant is not large enough to use a full time dispatcher, use a part time man during excessive demand periods. Many plants do not know that these charts can be

checked at the power company. The curves referred to previously can be a very valuable plant record to assist you in determining your danger points. You many even want to install your own demand meter so you can have a permanent record.

Watch Energy Use

Energy charges represent the amount of work done with the power consumed in your plant. It is billed in kilowatt hours or kwhr and the charges are generally arranged in steps or blocks. The more power you use, the cheaper it gets. If your rate is a straight step rate, it may look something like this;

1st 30,0000 kwhr	@	$0.016
2nd 30,000 kwhr	@	0.01
Balance	@	0.006

Many power contracts have energy blocks tied in with the demand. Using the above step rate as an example your contract might read that the above rates will apply to all power equal to 150 times the monthly billing demand. The remainder of the energy used during the month to be billed at $0.004 per kwhr.

Assuming a demand of 1000 kw and an energy consumption of 450,000 kwhr your bill might look something like this:

150 X 1000=150,000 kwhrs to be billed at above rates

30,000 kwhr	@	$0.016	=$480.00
30,000 kwhr	@	0.01	= 300.00
90,000 kwhr	@	0.006	= 540.00
150,000			$1,320.00

The remainder of the energy;

450,000 kwhr
— 150,000 kwhr
300,000 kwhr @ $0.004=$1,200.

Total energy cost $2,520.00

Without the demand tie-in the same power would have cost;

30,000 kwhr	@	$0.016	=$ 480.
30,000 kwhr	@	0.01	= 300.
390,000 kwhr	@	0.006	= 2,340.

Total energy cost $3,120.00

The effect of the demand tie-in is to control the amount of power that you have to buy before you qualify to obtain the cheapest rate. If the above demand were reduced to 750 kw, you would not only reduce the cost in the demand portion of the bill but would also reduce the cost of the kwhr portion. In this example, reducing the demand 25 per cent saved $400 per month or $4800 a year.

Reducing energy charges is getting to the cause of waste of power. This is the visible waste. Lights left on, motors left running, and equipment operating when not needed. Some of this waste is just plain carelessness, but there are a lot of places where some changes will have to be made before the waste can be eliminated.

Take the question of lights burning when not needed. If your plant is the typical plant, not too much attention was paid to circuit switching in the lighting design. Individual offices can be controlled, but large areas in the plant are something else. Even if some attention had been paid in circuitry on the original plant layout, it is doubtful that the arrangement stays static. Equipment is moved and line processes are changed, so that lighting a small production line may call for a large block of lighting to be left on.

Check Janitors

Night lighting for weekends or off shifts should be set up so as to make it easy for the watchmen or janitors to turn off all except the required lighting. You can't expect a watchman to set up a light pattern to see by. Have these necessary lights tied on to a separate circuit off a fuse block, independent of the light switches. "Wiping" the panel clean will still leave necessary lights burning.

Cleaning of offices at night by janitors does not require 100 footcandles. Paint the switch handles white for the necessary lighting required for cleaning the offices. The janitors will do the rest, and you will not be criticized by general management, who, in driving past the plant at night, see the main office building lit up like a church.

Air leaks call for compressor horsepower. While the plant is operating, noises drown out the escaping air. A trip through the plant on weekends by pipe-fitters will take care of these leaks, and reduce your loading on the air compressors. One plant found it needed 150 hp to take care of leaks. Not only is energy wasted, but demand was also increased by this amount. Reducing air pressure from 120 psi to 90 psi and repairing leaks saved this plant $15,000 a year.

Water leaks are another waste. "Water doesn't cost us anything. We have our own wells," said one plant manager. What he didn't realize was that water in the ground was of no use to the plant. It had to be pumped out and pressurized for plant distribution. The power company had to be paid for the power used in pumping. When he found out how much it cost, he became interested in water leaks.

Shut Down Blowers

Ventilating blowers are another big waste. These fans are left on day and night. Many are used to clear smoke and fumes. In winter, they blow out heat that required tons of coal to produce.

One plant found it could shut down 750 hp of fans during the winter months which saved $680 a month on demand charges, plus $1,500 a month on power. A map was made of all the fans, and those shut down had their fuses removed and the switch tagged out. In the spring, they were turned back on when the heating was shut down.

One of the reasons the power company is interested in your plant power factor is that low pf causes power loads to draw more current to perform the work than if that load were operating at high pf. Current is the factor that causes losses in transformers and power lines and the power company must absorb these losses up to the point of metering in the plant. Naturally, the power company would like to maintain as high a pf as possible on their system to keep losses low.

The additional current caused by low pf does not register on your meter so you do not pay for this portion of the power even when the losses occur in your plant. Most rate structures have a pf clause to take into account the additional expense to the power company due to low pf. The break even point has been set up by many power companies at 85 per cent pf. For any pf over 85 per cent you may find a credit in your rate schedule. Under 85 per cent pf is likely to result in a penalty.

These credits or penalties show

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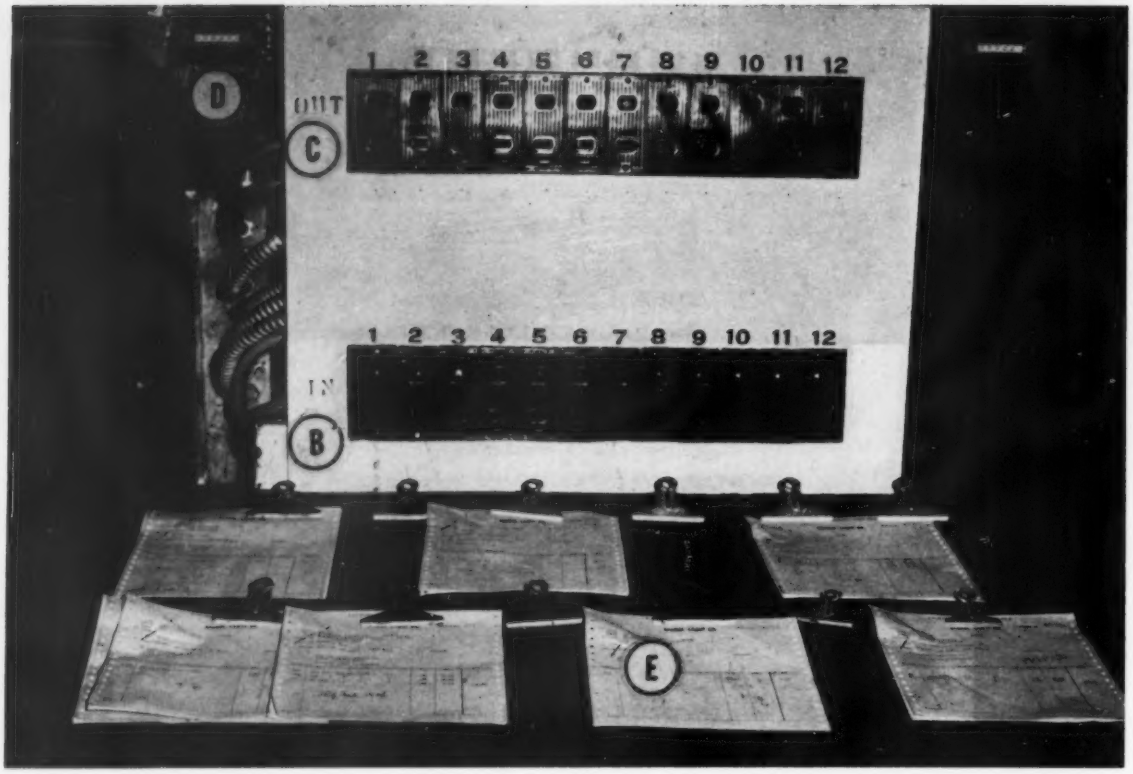


Fig. 1. This photograph shows the shipper's control panel which is located some 75 ft from the overhead storage. It consists of two sets of control switches. Controlling the input is B, and controlling the outgoing end is C. An electric eye controls the counter, D. Stored shipping papers, E, fastened to clips on the desk are completed and ready to be signed.

CONVEYOR "RESERVOIR" SPEEDS SHIPPING

Eliminates Rehandling and 5 O'Clock Delays

By A. H. HERMANN, Superintendent, Samuel Cabot, Inc., Chelsea, Mass.

OUR HANDLING PROBLEM, at Samuel Cabot, Inc., involved speeding up our shipping department, making it more accurate, preventing delays in loading trucks and freight cars, and decreasing our shipping costs.

The solution, we found, was to keep shipments alive and to avoid rehandling.

Our company manufactures paints and stains. These are packed in five-gallon pails, four-gallon cartons, six-quart cartons, and twelve-pint cartons. Our shipments may run anywhere from one to 1000 packages, going to all parts of the United States, Canada, and Hawaii. They go by parcel post, railway express, in freight cars brought in over our spur track, and our own trucks making deliveries to local expresses. But, by far the greatest bulk goes by trucks that pick up throughout the day, mostly between 2:00 and 5:00 P. M. In the past we had no efficient way of assembling shipments in advance, and this resulted in considerable delay during the afternoon rush, especially in the busy spring and summer painting months.

We can now put up orders in advance and store them on overhead conveyors, all checked and addressed with waybills completed and ready to be signed.

The goods are gathered from various parts of the warehouse and brought by conveyor to a central shipping control point. Figure 1 shows controls for the system. Here the consignee's name and address are stenciled on each package, and the shipper then routes the packages direct to any of three loading

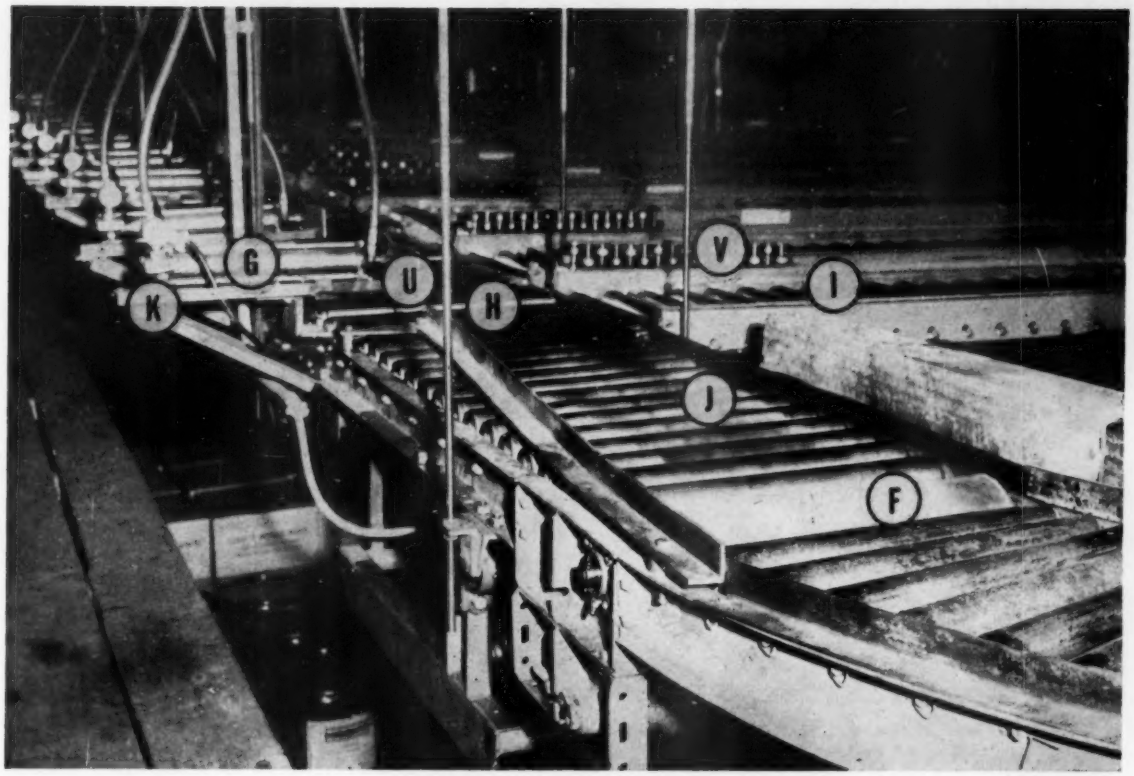


Fig. 2. Spacing roll, F, is driven by same shaft as under-driven conveyor, J. Air motors, G, operate on a minimum of 100 psi and exhaust into a common header which results in a reduction of the pressure to 10 psi. This low pressure, assisted by a quick release valve, K, enables the plunger to return quickly to its starting position. See text for details.

docks or into the overhead storage conveyors. Our packages now move so fast that brush stenciling has been replaced by much faster roller stenciling.

This overhead storage section (Figs. 2, 3, 4) is suspended from rafters and consists at present of thirteen cross runs, each of which will hold about thirty-five packages, and these are often filled and emptied two to four times each day. It is designed so that more sections can be added for future expansion, and the motors driving the feed-in and take-off belts are powerful enough to handle the added load.

The shipper from his control point, Fig. 1, routes the packages onto the feed-in belt serving the overhead storage section. Now, note Fig. 2. Just before the packages reach the overhead, they pass over a spacing roll, F, rotating at half the speed of the input conveyor, J, which is underdriven and serves the thirteen cross runs, I. Along the input conveyor, directly opposite the head of each cross run, are located the thirteen air motors, G, that push the packages into the runs. Each motor is actuated by a switch assembly, H, consisting of a small-diameter roller bar extending across the input conveyor with a Micro Switch at each end. From his control post the shipper activates the switch bar for the air motor serving any desired cross run by throwing a switch on the control panel and thus the packages are guided into the correct storage area.

With the entering packages correctly spaced by the spacer roll, F, the air motor—by means of a plunger, U, easily pushes them off the steel rollers of the underdriven input conveyor, J, onto the cross runs, I. A quick-release valve, K, permits a very fast return of the plunger to its starting position before the next package arrives. A set of rollers, V, acts as a funnel to center each package on the cross run.

At the end of each cross run there is a brake, L in Fig. 3, under the last six rollers and a dead-stop bar rising above the level of the cross run between the last two rollers, O in Fig. 4. This holds the packages on the cross runs until they are wanted for loading.

The brake and bar are held in the "stop" position by a coil spring, W in Fig. 3, so that accidental loss of air pressure will not release the packages onto the take-off belt, P in Fig. 4. Their release is effected by the shipper from the central control panel. When he throws the correct switch, a small, one-way air motor, M in Fig 3, works against the coil spring releasing the brake and pulling the stop bar down below the rollers. This releases the stored packages which move onto the take-off belt, P.

Thence they are carried down to

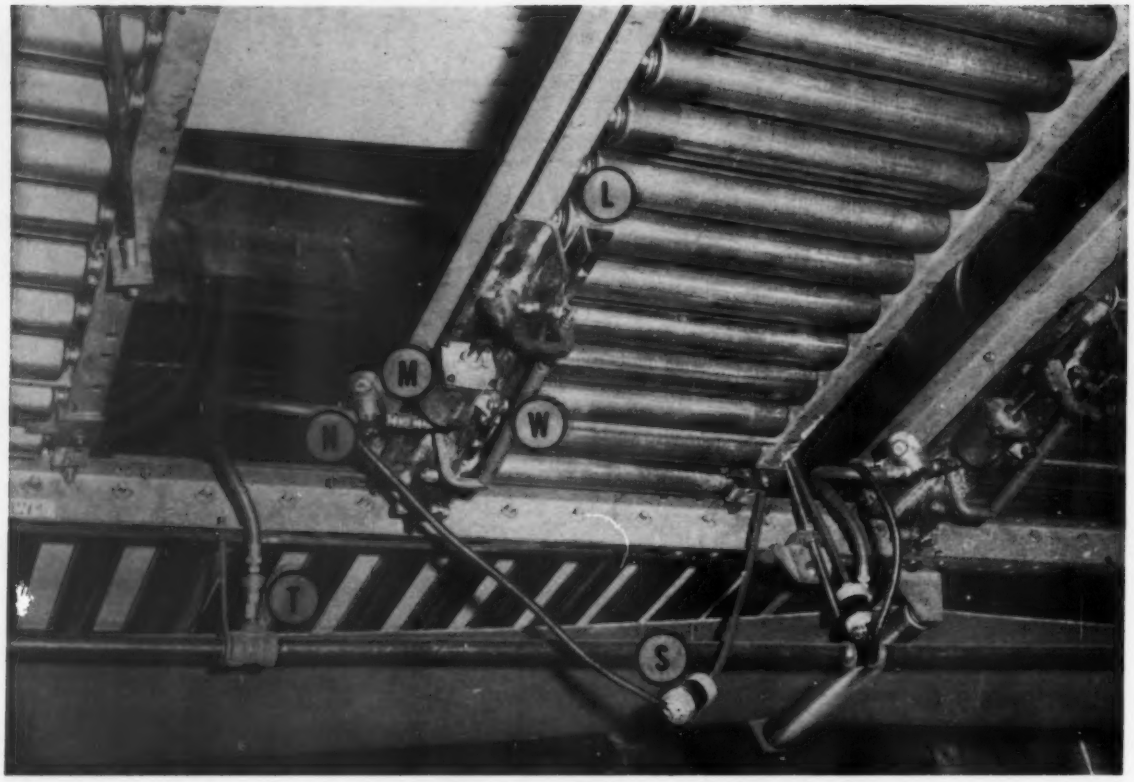


Fig. 3. This photo shows the underside of the storage conveyor on the outgoing end. N is the solenoid valve that operates the one-way air motor, M. This works against the spring, W, which releases the brake, L. Please note that T is a quick-disconnect air coupling and S is a locking plug connector that allows quick replacement of any defective parts.

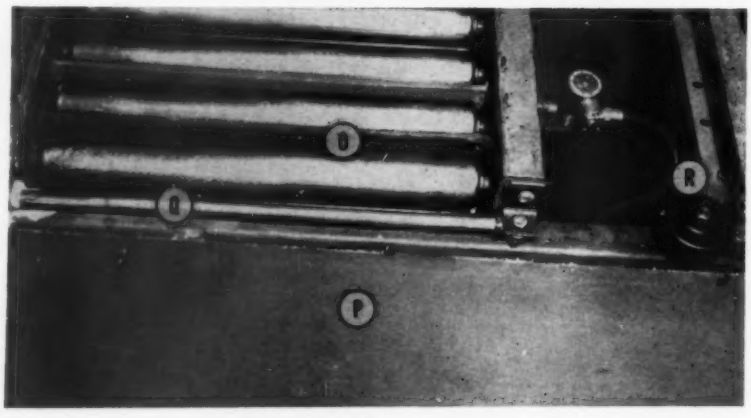
a special loading dock reserved for the overhead storage. At the end of the conveyor where the truck driver takes off the packages there is a stop bar. When a package pushes against this bar, it throws a momentary contact switch shutting off all sections of the belt take-off conveyor, thus preventing any pile-up of packages at the loading end. When the driver takes off the end package, the bar snaps back releasing the conveyors to deliver more packages.

All packages are counted, at D in Fig. 1, by an electric eye as they go into the overhead storage. This count is checked against the bill of lading count.

This overhead storage system has proved particularly helpful in loading freight cars and has cut that loading time in half. The overhead runs act as a reservoir, allowing the order pickers to keep steadily at their work without having to wait for the carloading crew to catch up with them, as they have to stop at intervals to put up bracing. In the same manner, it acts as a reserve which eliminates any waiting for goods by the carloading crews, since they can often load a car faster than the stock pickers can work. We have found that 300,000 lb can be shipped each week now with only two men in the shipping room and up to seven hundred orders every day.

It is sometimes desirable to pass packages through the overhead area without being stored, and this is made possible by a loop conveyor running from the further end of the input conveyor to the further end of the take-off belt conveyor. **End**

Fig. 4. This view shows the dead-stop bar, O, at the end of each cross run. The small bar, Q, is necessary to let the packages reach over onto the belt conveyor, P. The small roller, R, helps packages make right angle turn onto conveyor P.



MACHINE TOOLS "OFF THE SHELF"
Standard Units Used in Custom Combinations

By H. M. EVERSZ
Chief Plant Engineer
McCulloch Corporation
Los Angeles, Calif.

Fig. 1. Typical built-up multiple drilling machine with two drilling stages and four-position turret. Among standard components mounted on Kingsbury base are two Stanax-Campbell multiple spindles and an Ex-Cell-O drive unit.

SEVERAL YEARS of experience are now behind our Plant Engineering department, in their use of rotating shelf stock of standard machine tool units to build up special, heavy-duty, mass production shop tools. Some of these special tools are highly intricate mechanisms which will accomplish a half-dozen operations on a single part, and may contain components originally produced by a half-dozen different machine tool manufacturers.

This program was inaugurated to provide two very fundamental savings—time and money. Production at McCulloch consists largely of turning out thousands of duplicate lightweight parts for the company's extensive line of gasoline engines. These engines are used to power outboard motors, chain saws, a variety of augers and other tools. Most of the parts for these engines originate in our own die casting department and require only a series of final machining operations to finish them.

Prior to building up our own special tools, we used either standard machine tools or custom-built special tools for this type of work. Both had disadvantages insofar as our own particular requirements were concerned. The average standard machine tool is a highly versatile piece of equipment, adaptable to a variety of operations, and excellent when work requirements vary from day to day. But when these tools are set up to do the same job day after day, all the built-in versatility is wasted.

A second disadvantage of standard machine tools in our production work was that, despite their versatility, they could not be set up to accomplish more than one or two operations on a single part. Many of our die-cast engine parts, such as connecting rods, pistons or crankcase frames, require four to six finish machining operations such as drilling, boring, reaming and spot facing. Thus, when standard machine tools were used, the same part would have

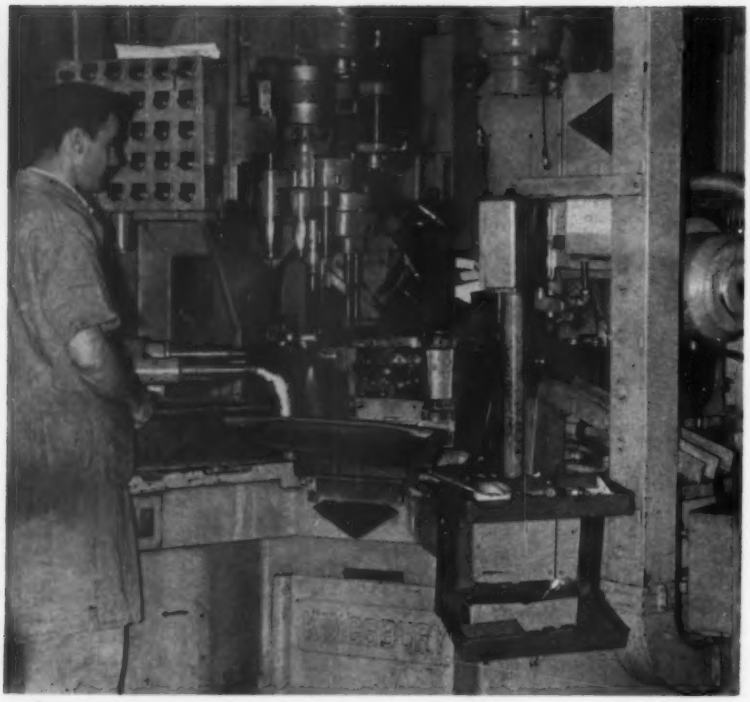


Fig. 2. Connecting rods are finished in machine built around six-position table.

to be transferred from machine to machine for final finishing. This created a problem of holding and jigging the part in each setup.

The disadvantages of custom-built machines for our type of work are two-fold: First, the cost of such machines is excessive; second, the lead time required to procure such a machine is often a greater deterrent than its cost.

Our current practice of using standard machine components, to build up special machines is not a program that can be blueprinted like a simple "how-to-do-it" project; each machine is a special job in itself. Before McCulloch engineers can act in producing the required machine tool, we must know exactly how many machine operations will be required to finish a part, the nature of these operations, their sequence, the tolerances that must be held, surface finish requirements, etc. Once this data is available, we can, literally speaking, go to our shelf stock of standard machine units, pull out several units (each of which will accomplish one of the required finishing operations), arrange them in the necessary sequence, then figure out a way to mount them on a single base.

A good example of one such machine tool is that used to work connecting rods. This tool includes a six-position turret table on which the connecting rods are given a single setup. As the turret table moves from station to station, the connecting rods are completely finished by the combined operations of three Delta drive units, four Ex-Cell-O drive units, and a combination of Delta, Bellows, and Stanax-Campbell single and multiple drill spindles. All of these standard machine units are coordinated on a single Kingsbury tool base.

These questions will normally arise . . . How are these various unlike machine units fitted together? Isn't it necessary to greatly modify some units to secure proper mounting facilities and placement?

Here again no blueprinted rules will apply, but the answer to the last question is usually negative. Very little modification work is done on the standard machine units themselves; rather, it is done on the base on which they are mounted. Usually the over-all tool design calls for a base structure which is ready to receive the standard machine units without modification of the unit itself. In all cases it is much less costly to modify a tool base, or even design and build a special base, than to produce a tool with each component custom designed and built.

Obviously, these special built-up tools lack changeover versatility; in most cases, changeover to produce another part is not even considered in the original design. Because of this, we never con-

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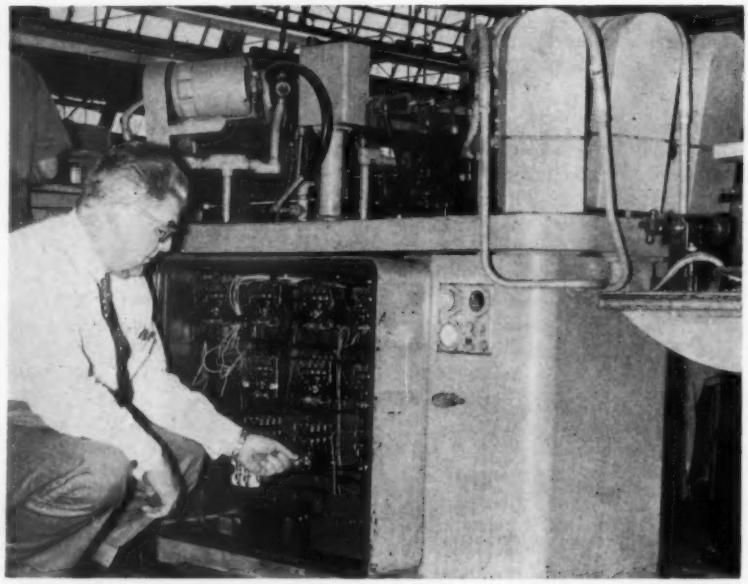


Fig. 3. Author checks wiring on six-spindle machine built to drill cylinder ports.

BEFORE: Building site where proposed receiving depot was to be built. Note the small park in center of the plaza.

AFTER: Platforms for unloading trucks in new receiving area. Old park was located just beyond Belgian block paving.

REJUVENATED VERTICAL PLANT CHALLENGES THE ONE-FLOOR PLANT TREND

BY SWAPPING a one-tree park for a piece of city street, Westinghouse's meter plant at Newark solved a traffic congestion problem, brought its receiving crew in out of the weather, and triggered a business reaction with booming echoes which might possibly be heard in every city in the country.

Across the cobbled street from Lackawanna's Newark station, a group of 50 and 75 year old 5-story mill buildings completely fill the block's street frontage. Where the paving widens at Plane Street, the railroad owned a pint size "park". Last year this park rescued its neighboring buildings from impending desertion and started a revitalization of the surrounding neighborhood.

Through the years, Westinghouse's Newark meter plant had grown from mill to mill until it occupied the entire block of ancient buildings. Reorganization of this sprawl was urgently necessary if more space was to be made available for continuing growth.

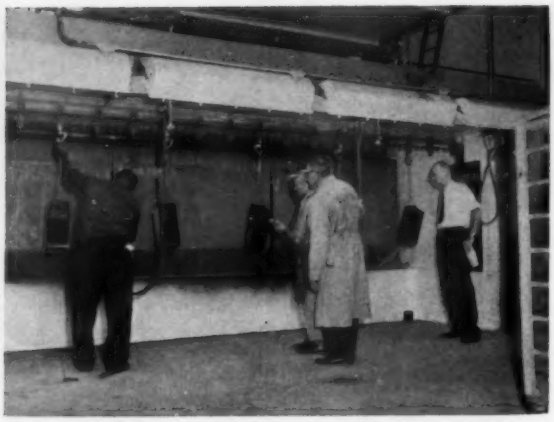
Gradually, the storerooms in the block had filled; additional warehouse space blocks away was costing hundreds of man hours of delay, plus some $125,000 in trucking and rentals every year.

Production lines were clogged with loaded and stalled

BEFORE: This is the old wire storage area previously located in basement of building. This is now office area.

AFTER: Wire is now stored in central storeroom for all materials. Racks make wire easier to find and remove for use.

BEFORE: Paint spray method formerly used was much slower than present method shown in picture at the right.



AFTER: New spray operation is set in proper sequence with degreasing and plating line. Conveyor goes to ovens.

pallets while a big receiving and shipping crew labored outdoors to load and unload an average of 125 trucks a day.

Burdened men and fork trucks strained up and down ramps between the different floor levels of the various buildings.

Raw materials fought for elevator and aisle space against the flow of parts and finished products.

Materials backed and filled from shop to shop, up and down, all around the block.

The receiving yard was the wrong end of the block, but it was the only adequate off-street area for handling trucks.

Build a New Plant

Facing up to the situation, Westinghouse estimated that a single floor new plant in a semi rural location, with floor space equal to the congested block's 350,000 sq ft, would cost 5 million dollars. Training a minimum of 1600 new people at a new location would cost another 2 million dollars plus headaches. The overwhelming majority of the company's Newark employees had 15 years or more experience and they deserved maximum consideration.

Plant management then took a long hard look at its blockful of assorted old mills. Could these antiques be adapted to manufacture electric metering and control equipment? Gray Grossnickle, manager, Works Dept., asked himself, "If I now had to move my operations into a bunch of buildings like this, how could I make it work?" During the first year Grossnickle studied many layouts, although several prominent consultants expressed doubt about the project's feasibility.

Consultant Irving Footlik said, "If it could be done here, you could do it in any combination of old buildings you can find in the whole country. You're so short of space here that you must have to throw your scrap out of the windows!"

Grossnickle was encouraged by J. M. Wallace, the Newark Division Manager. Several million of Westinghouse dollars, and urgently needed apparatus production, had been tied up for months during construction of their new one-floor plant at Raleigh, N. C. Could the old Newark plant solve its own problems and still maintain production?

Small Park to the Rescue

Grossnickle determined that building a 2-story structure on an 18,000 sq ft court at the Plane Street end of his block would provide the additional 40,000 sq ft space needed. Though the court was cluttered with fire escapes, a garage, an annealing shed and an oil house, it was in the middle of things. It ventilated six of the block's eleven buildings, those which housed the plant's heaviest activities. This could serve as a distributing center, but how to get access to it was the problem.

The solution lay in the park. If the Lackawanna Railroad would sell it and if the city would then exchange the park for the part of the street next to the Westinghouse buildings, trucks could load and unload there. The first floor of one building could contain the receiving and inspection operations, and pass materials through to the court. The Lackawanna and the city both approved.

An elaborate scale model of the proposal, complete with miniature conveyor systems, connecting machines and operations, was taken to Westinghouse headquarters in Pittsburgh. Top brass then journeyed to Newark from Pittsburgh for a full scale examination of the situation; they approved.

The main elements of the plan are simple and direct. First floor levels are brought even. The heaviest presses are located in the court, served by a 6 ton traveling crane located just under the 24 ft ceiling. The crane spans two-thirds of the width of the court and also serves the mezzanine at one end. The mezzanine opens on to the second floor, the highest level for processing heavy materials. The second floor of the court also has a 24-ft-high ceiling, and ample room for all active storage.

This central storage area is the hub of material movement. Taking maximum advantage of gravity, conveyors deliver partly processed components to work centers and finished assemblies to shipping operations, and make possible the absolute control of production and sequence from the distribution center. This frees

BEFORE: This was an assembly area before the rejuvenation took place. Contrast this picture with photo at right.

AFTER: This is the same operation as that shown at left. Note orderly supply of components and well-lighted area.

each working unit for its job of making parts or assembling sub-components and testing.

The plan locates production units around the court, frees the other buildings for research and testing labs, for methods and procedures, for engineering and tooling, and for administration. These completely modernized and air-conditioned offices will cost less than half as much as new construction started from scratch.

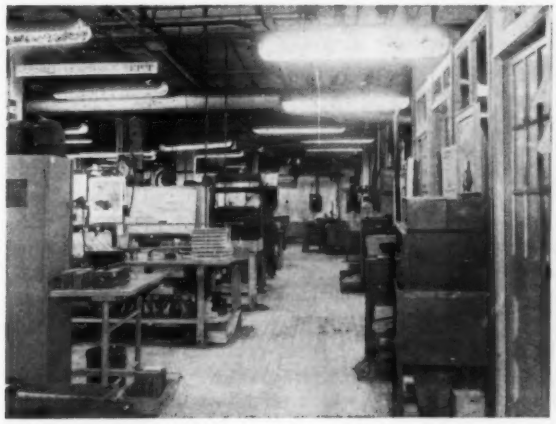
Execution of the plans took careful managing. Through the spring of 1957 work went on almost as usual while the court building was erected. Then on July 1st the plant closed for a 3 week vacation. During those 21 days, over 150 punch presses—some up to 300 tons capacity—were moved out to the new court building, old building floors were adjusted to level, all machinery was repainted and then re-set according to the new layout.

That completed the major elements of the project, and set up one of its most important advantages. With production resumed at full tilt, materials handling layouts could be tested and improvements made as they were installed. "Without making a huge commitment to a whole new system", Jim Wallace says, "we improvize and test as we go. Each part of the project immediately becomes self-supporting. And we can make additional improvements as cash is available."

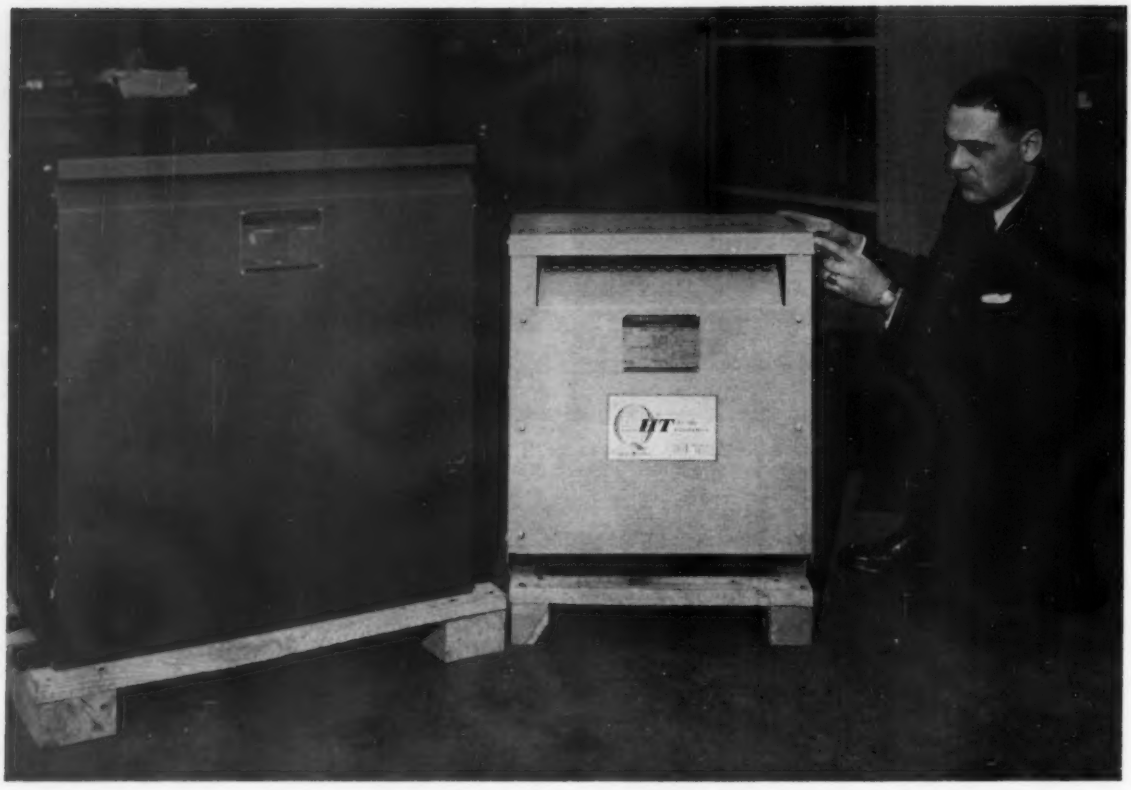
The project is more than half completed. Building revisions and new construction have cost about $750,000. Revision of manufacturing layouts, conveyors and vertical equipment investments are under $500,000. When all the equipment for flexible new work centers is installed and the smart new office areas are completed and occupied, the total bill will run less than $2,200,000.

Westinghouse is obviously delighted with its decision to renovate its old multi-story buildings rather than build and move to a new single floor suburban plant. It saved important amounts of money. While substantially increasing capacity, it lost no production time. It held its trained personnel, and eliminated many non-productive jobs (most people in such jobs were transferred to productive work). Much expensive materials handling equipment—including eight electric fork lift trucks—was retired. Remote storage was eliminated and truck docking operations were reduced to a substantial degree. **End.**

BEFORE: This was a typical manufacturing operation in the old 5 story building. It has now been made into offices.



AFTER: This is one example of the completely redesigned, renovated office areas. It is in the area shown at left.



Side by side comparison of a 45 kva unit illustrates reduction in size using silicone impregnated insulation. Depending upon kva rating, units run up to 50 per cent smaller, 35 per cent lighter and 15 decibels quieter than previous transformers.

TRANSFORMER SIZE CUT IN HALF

Lightweight Units Rate High in Performance

UP TO 50 per cent smaller, 35 per cent lighter and 15 decibels quieter than previous models, a completely new line of general purpose dry-type transformers has been introduced by General Electric Company. Used for supplying lighting and power loads in commercial and industrial applications, the new units are a product of the Specialty Transformer Department, Fort Wayne, Indiana.

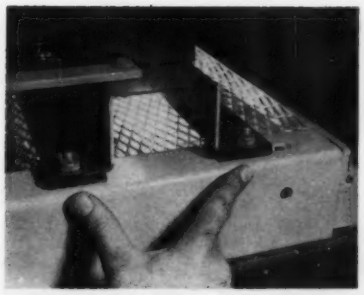
Designed for quick, easy installation, the transformers can be located at the load, or anywhere, thus eliminating the need for long, costly low-voltage feeders. They require no vaults, barriers or ventilating fans. Popular ratings have built-in wall mountings on the case and with wall studs in place, the units slip into position easily. Large terminal compartments, wiring spaces and all electrical connections are easily accessible for quick connection.

Leads are metal tagged and terminal boards marked for easy identification. Knockouts are provided for conduit connection and lifting provisions are provided on all units weighing over 65 pounds.

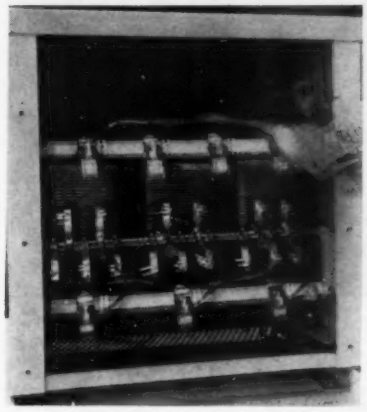
Rated 600 volts and below at 25 va to 167 kva, single phase, and 3 to 500 kva, three phase, the new Quiet High Temperature transformers are available in three types. Designated B, F and H, each is designed with a newly developed silicone impregnated insulation system.

Virtually maintenance free, the transformers have aluminum windings and an interleaved steel core which is annealed after punching. On units up through three kva and units from 30 kva up, the core is jacketed in a welded steel clamp, thus avoiding vibration or loosening of the laminations. Laminations are made of cold rolled silicon grain-oriented steel for light weight and efficient operation.

Units rated 30 kva and up, float on rubber which reduces noise transmission through mounting brackets and conduit to surrounding building surfaces. There is no metal to metal contact between the case and the core and coil assembly. Rubber pads fit underneath clamps which hold the core and coil.



Rubber pads absorb all vibration and prevent hum transmission to the case.



Multiple exposure of core and coil shows flexibility of rubber mounting.

Type B transformers use an 80 C rise insulation system and are rated 25 va through three kva, single phase. Maximum operating temperature is 130 C. The units have exposed cores and are designed for indoor installations. Wiring compartments are located at the bottom with connection diagrams printed on the handhole cover. Alkanex wire, asbestos layer insulation, polyester resin-asbestos laminate, glass tape and inorganic silicone impregnation are used in the construction of the type B transformer. The silicone treatment adds to the long life characteristics of new units.

Type F units, rated five through 25 kva, single phase, and three through 15 kva, three phase, are designed with a 120 C rise insulation system. Maximum operating temperature is 170 C. Constructed with exposed cores for outdoor and indoor applications, they can be wall mounted and have large wiring compartments. Using insulating materials identical to type B, the transformers resist moisture, dust and corrosive atmospheres.

Transformers designated type H and rated 30 kva and above, single and three phase, operate with a 150 C rise insulation system. Encased and constructed with a welded core, they are designed with natural draft ventilation for indoor applications.

Built-in lugs are provided for floor or wall mounting. The type H group has solderless connectors, a tap-changing terminal board and a front mounted diagrammatic nameplate. Connections are made in an easily accessible, large wiring compartment located in front of the core and coil assembly.

Using the new silicone insulation system, NEMA Group III, the impregnated units are built with silicone-glass covered wire, silicone-asbestos layer insulation, mortar-asbestos, silicone-glass tape and other inorganic substances which have been tested for a maximum operating temperature of 220 C.

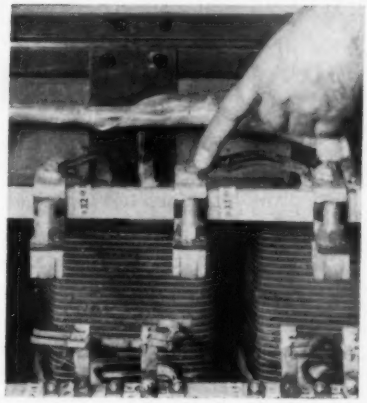
Substantially smaller than previous designs, the new transformers have been improved in appearance and are easily handled and installed. They use less floor space than their predecessors and are suitable for both industrial and commercial building applications.

Type B and F units have slotted brackets for mounting on posts, walls or surfaces of equipment. Type H transformers can be located on floors, platforms or walls. The only foundation necessary for the type H unit is a level surface strong enough for support.

Standard distribution voltages for the line are 600, 480 and 240 volts. Standard load voltages are 480, 240 and 120 volts. The new line meets ASA and NEMA requirements for transformers and specialty transformers.

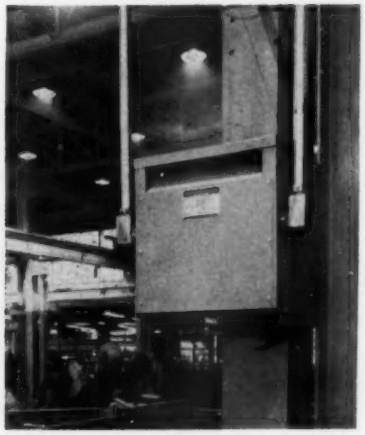
When transformers are used to correct low voltage conditions, it is extremely important to have taps available to adjust the output voltage to the desired value. The new line of transformers is available with a wide variety of tap combinations. You can obtain four 2½ per cent taps below rated voltage, two 5 per cent taps below, and two 2½ per cent taps above and below line voltage to correct for any line condition. These tap combinations, however, are not available in every kva size. **End**

If you would like more information about these new transformers, write to the Editor, Plant Engineering, 308 East James St., Barrington, Illinois, or indicate "QHT Transformers" on the post card in this issue.



Coil leads are welded at terminations to prevent high resistance connections.

Cover is easily removed for access to terminals in the wiring compartment.



Lightweight compact transformer installation on the column close to loads.

Delegates representing the many chapters of the AIPE attend the annual Board of Directors meeting held in Cleveland.

AIPE HOLDS ANNUAL MEETING

AT THE ANNUAL meeting of the Board of Directors of the American Institute of Plant Engineers, held on Sunday, January 25, in Cleveland, Ohio, the delegates reviewed the activities and accomplishments during the past year, elected new officers and outlined plans for committee activities during the coming year.

Newly-elected officers of the AIPE are: William C. Wallin, Western Electric Co., Winston-Salem, N. C., president; James Weeks, Proto Tool Co., Los Angeles, Calif., vice president; Fred G. Fryberger, Food Machinery and Chemical Corp., Baltimore, Md., secretary; and Leo Monty, Artisan Metal Products Co., Waltham, Mass., treasurer.

New Officers of the American Institute of Plant Engineers

W. C. Wallin
President

J. M. Weeks
Vice President

F. G. Fryberger
Secretary

L. J. Monty
Treasurer

New regional vice presidents are: H. Smith, Diamond Alkali Corp., Newark, N. J.; A. J. Bossert, Cornell Aeronautical Laboratory, Buffalo, N. Y.; W. Gruca, Standard Forgings Corp., East Chicago, Ind.; M. G. Renner, Carling Brewing Co., Atlanta, Ga.; C. A. Gallaher, Robertshaw-Fulton Controls Co., Anaheim, Calif.; R. C. Mounsey, United Shoe Machinery Corp., Gloucester, Mass.; and G. W. Austin, Gulf Atlantic Wholesale Co., Houston, Texas. Fred Aston, Kraft Foods, Ltd., Montreal, Canada, will continue to serve as regional vice president for the Canadian area.

The new executive committee, consisting of the officers and regional vice presidents, will take office on June 1. Kay Buchanan, formerly assistant secretary, was named administrative secretary to serve in a full-time capacity at international headquarters.

Major expansion of the AIPE included the affiliation of seven new chapters during the past year. Seminar activities were extended to include participation with ASME and SAE in the presentation of technical sessions and joint sponsorship of plant engineering sessions with the University of Wisconsin and Purdue University.

The AIPE was accepted as an associate member of Engineers Joint Council and a committee of past presidents, headed by R. H. Morris, was appointed to represent AIPE in the EJC activities.

Included on the All Engineers Luncheon program was the presentation of the AIPE Award of Fellow to Sloan S. Sherrill of the Western Electric Company.

The first Chapter Activity Award, based on a comparison of the levels of activity of competing chapters, was presented to the Northwestern Ohio Chapter.

Plans for the coming year include the publication of the Plant Engineers Code, a definition of the responsibilities, organization and functions of the plant engineering department; completion of a survey of maintenance by contract; loans from the Student Aid Fund, which will be made available to deserving students; and an expanded program of technical sessions in cooperation with other societies and with engineering schools.

The annual meeting was preceded by an executive committee meeting and followed by an AIPE Chapter Clinic, held on January 26. Officers of twenty-two chapters were present to participate in a discussion of chapter problems.

One of the highlights of the AIPE activities in Cleveland was the All Engineers Luncheon, which was held on Tuesday, January 27, in the Cleveland Hotel. The luncheon program included the presentation of the AIPE Award of Fellow, made annually to an engineer of distinction, to Sloan S. Sherrill of Western Electric Co. The award went to Sherrill just a few days before retirement from his position as assistant superintendent in charge of Factory Planning and Plant Engineering and Plant Inspection for Radio Shops at Western Electric's Winston-Salem and Greensboro, N. C., plants. New national officers were introduced and an inspiring address given by Dr. G. Herbert True concluded the program. **End**

On Tuesday, January 27, members from the Chapters of the AIPE along with the many plant engineers attending the Plant Maintenance and Engineering Show and Conference took part in the luncheon at the Cleveland Hotel.

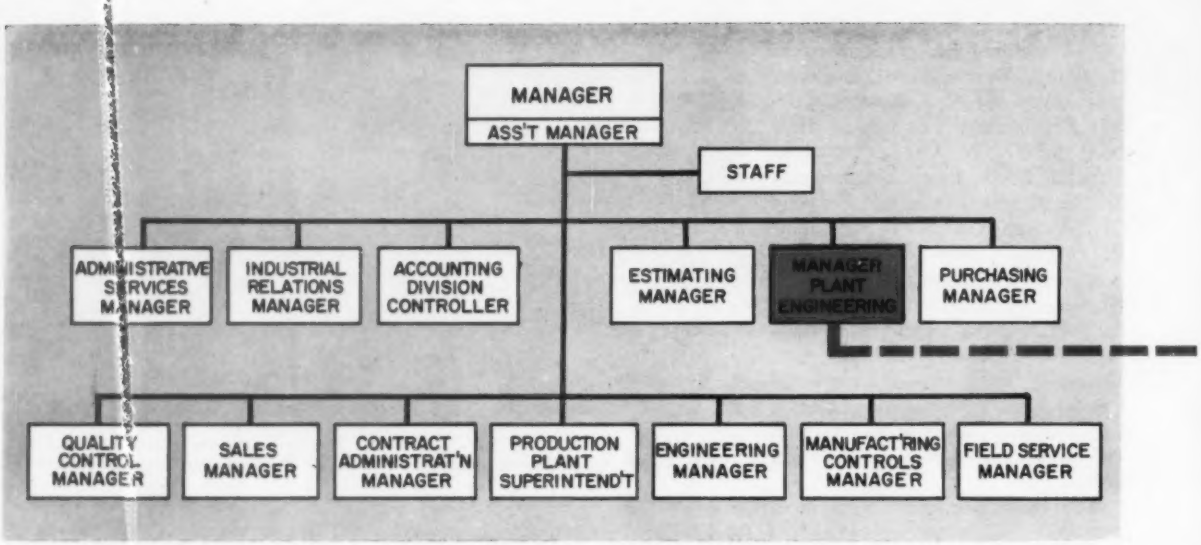


Fig. 1. Organization chart of management personnel shows plant engineer reporting directly to the division manager.

SPECIALISTS FOR EVERYTHING!

That's Plant Engineering at AiResearch

A MERE DETAILED physical description would still leave a lot unsaid about the Plant Engineering Department at AiResearch Manufacturing Company of Arizona, a division of The Garrett Corporation, located in the middle of the desert at Phoenix. The organization, operation, equipment, facilities, and personnel quota of this department parallels that of any top-notch plant engineering department anywhere. When departmental responsibilities are discussed, it becomes vividly evident that this particular Plant Engineering Department has reached a top level of in-plant importance and cooperation.

The AiResearch Phoenix plant is one of the nation's largest manufacturers of small gas turbines and pneumatic valve equipment for both military and civilian aircraft and missiles. Four large production and test buildings, along with several warehouses and smaller auxiliary buildings, cover more than 500,000 sq ft of area. Some 3400 people are employed. The shops contain some 700 production machines, and with test and maintenance equipment, about 1100 major machines in all.

Due to its desert location, with torrid summer days and near-freezing mid-winter nights, comprehensive heating and refrigeration systems are employed. Because of the high precision work accomplished in the shops, all production and test areas must be held within plus-or-minus 1½ degrees F the year around. This is no small problem with outside temperatures varying all the way from 120 F to mid-winter lows near freezing. Desert dust is another problem, and to expedite both heating and cooling, and to maintain dust-free air, the entire production and test areas are slightly pressurized so that there is always an outflow, never an inflow of outside air.

Fig. 2. Air view of plant with major production building in left foreground and huge test facility near top of photo. Black-roofed building is for pneumatic control assembly.

Needless to say, the responsibility for proper operation of all this equipment rests squarely upon the plant engineering department, as did the design and installation of both the heating and refrigeration facilities, the installation of all machines, the design and proper erection of all buildings, and the design and fabrication of all specialized plant equipment and tooling which falls

Manager, Plant Engineering

LaMar C. Nielson, 50 years old, is a graduate of the Inglewood Electrical College. His first job, during the depression, was as a maintenance man with a music company. He became affiliated with The Garrett Corporation as an AiResearch Manufacturing Company maintenance man some 18 years ago. He has now been manager of the AiResearch Phoenix plant engineering group for 7 years.

LaMar is married and the father of six daughters. He lives in Phoenix. His hobbies are hi-fi music and electronics. In conjunction with the latter he maintains a very complete home laboratory and workshop.

outside the category of a conventional tooling department. But in this case, additional responsibilities are imposed.

The AiResearch Plant Engineering Department is responsible also for the safety of the 3400 employees working in the plant, and for maximum insurability against loss of all the highly specialized, and sometimes hazardous equipment and supplies used in the plant. This includes the large test building where, in numerous individual test cells, gas turbines are tested at full speed, and rooms where pneumatic valves are tested at high air pressures. It is evident that the handling of fuel and air supplies both to and in this test building, and employee safety during the tests, is a problem of unusual proportions.

Delegation of this responsibility to the plant engineering department occurred about a year ago, when two plant-wide bulletins were published setting forth in detail the new regulations. Excerpts from these bulletins state specifically that . . . . .

"Effective February 3rd, 1958, LaMar C. Nielson, Manager, Plant Engineering and Maintenance Department, in addition to his normal duties, is assigned the responsibility of directing, coordinating and approving all activities in the areas of personnel safety, property damage and risk insurability when concerned with building additions or alterations, equipment installations, use of fuels, chemicals or power sources, production or development testing involving new test procedures or equipment, or tests involving equipment with a past record of malfunction."

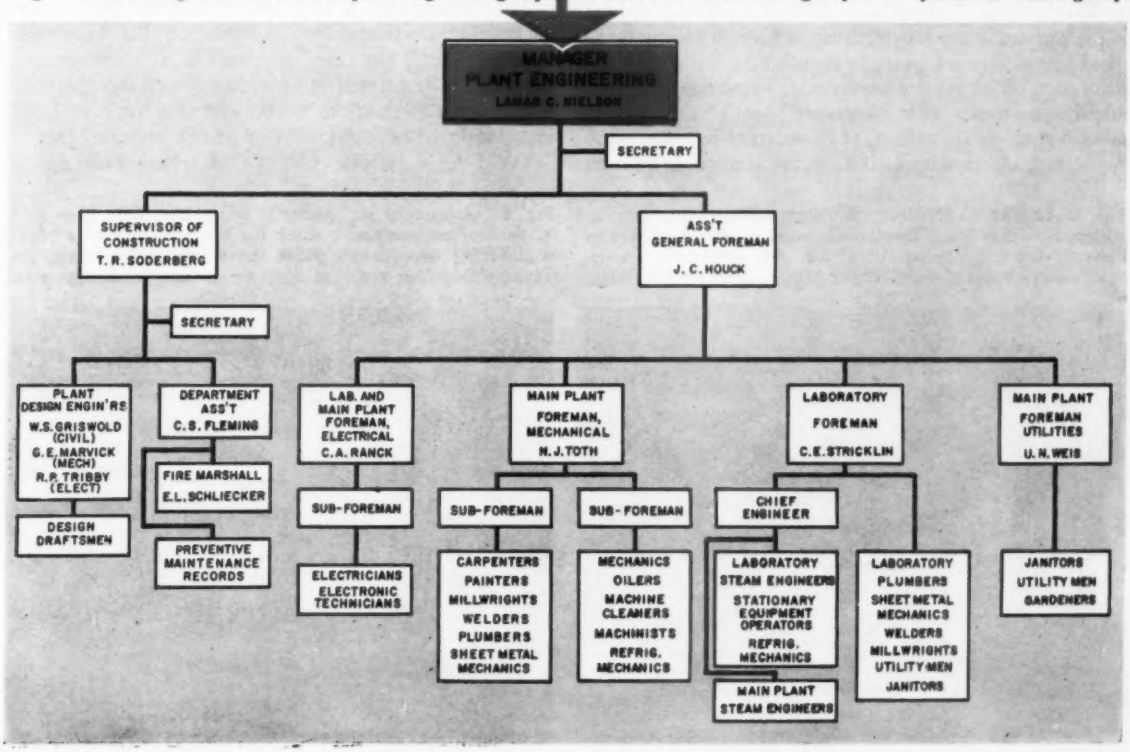
And in the second bulletin . . . . .

"It is the responsibility of each Department Head to submit in writing to LaMar C. Nielson, Manager, Plant Engineering Department, all contemplated actions which may involve special insurance problems, and obtain his approval before any action is taken . . . . ."

This responsibility was delegated, not in a small plant, but in a large division of a huge corporation which maintains both specialized safety and insurance departments.

But Nielson squelched with a few terse remarks the impression that there might be some overlay or inter-

Fig. 3. Detailed organization chart of plant engineering department shows various work groups with specialists in each group.



DATE: 12-29-60 REPLY

TO: D. E. Garner
CC: J. W. Gebhard
E. Buckner

This Request is:
☐ Approved
☒ Approved subject to conditions below
☐ Not approved (see comments below)

Comments and Conditions:

A review of the proposed test area discloses these requirements to be necessary in the interest of the loss prevention program:

1. The area under canopy is required to be of concrete construction.
2. All electrical in the fuel test area is required to comply with N. E. C., Class I, Division 2, Group D.
3. All service and utility lines are required to be underground and comply with code from point of origin to their termination point.
4. High pressure air lines shall be fabricated from approved materials.
5. Future inspections of the test area by F. I. A. may require automatic sprinklering of Building "K" if tests being conducted indicate sufficient magnitude.
6. All test set-ups utilizing 3000 air pressure or higher are required to be specially shielded to protect personnel and equipment.

Cecil E. Fleming — Gen. Supvr., Plant Engineering

REQUEST

DATE: December 20, 1960
TO: Plant Engineering

SUBJECT: COMPONENT TEST AREA

Approval is requested for performing operations within this department involving the following hazardous conditions:

Establishment of a Component Test Area at the west end of "K" Building, as laid out in the attached sketch. The area inside "K" Building would be used for testing non-fuel components such as Dumores, pressure switches, speed sensores, etc. Fuel components, such as accumulators, fuel pumps and fuel solenoids would be tested in closed systems under the two canopies. Required utilities are:

3000 psig air
300 psig air
JP-4 fuel
CO_2
440 and 110 volt, 60 cps alternating current
24 volt direct current

Requested by: J. W. Gebhard — Department Head: D. E. Garner — Department No.: 47-69

Fig. 4. This is an example of a "Request for approval of operations involving hazardous conditions." This form shows implementation of memo giving plant engineering complete control over personnel safety and loss insurability.

ference of responsibilities between the three departments involved. "Every problem is tackled cooperatively. It is the duty of Plant Engineering to furnish all the technical knowledge necessary in its solution. Insofar as the insurance problems are concerned, insurance company inspection reports were channeled through our department before the delegation of the current responsibility. We could often detect that the insurance inspectors were unhappy with certain conditions, but nothing was ever done about it. Finally, we automatically took hold and corrected these conditions that were frowned upon by the insurance inspectors. As a result of this spontaneous activity, we were assigned the responsibility to continue it.

"And, insofar as personnel safety is concerned, our portion of the work is to apply our technical knowledge in a manner to prevent accidents. We in Plant Engineering are firmly convinced that effective accident prevention is much more useful than effective accident investigation. So we employ our technical knowledge to make certain that every facility or machine is erected or installed for maximum safety, and that it is used or operated in a manner to minimize the possibility of accidents."

Nielson pointed out that the plant engineering department has nothing to do with the insurance policies as such, nor with safety drives, slogans, or the business aspects of accident investigation and the filing of claims.

As to more normal duties and responsibilities, the AiResearch Phoenix Plant Engineering Department is responsible for all maintenance work, occupancy of the premises, and the design of all facilities, structures, and buildings. It is an entirely independent department, answerable only to the Plant Manager. Department personnel averages about 200 employees. Six engineers devote full time to civil, electrical and mechanical design work.

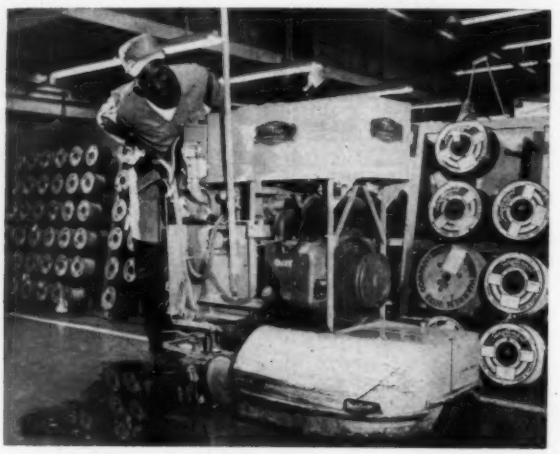
This design work includes rough design of all major buildings while working in cooperation with the engineering architects, and complete design of all minor buildings, building additions, structural facilities, and such items as plating equipment, racks, special tanks, handling facilities, etc.

The department is also responsible for all outside contracting pertaining to anything on the buildings, machinery, etc. The plant engineers must ascertain that the work is performed in accordance with the contract, in a manner to promote safety, and that the completed installation will comply with insurance requirements.

On a large outside contract, a major building or

Fig. 5. LaMar C. Nielson, Manager, Plant Engineering, center, conducts plant familiarization tour with members of Phoenix fire department. Plant also has volunteer fire department, with full-time chief, under plant engineering.

Fig. 6. Occupancy, or janitorial work, has often been said to be a prime measuring stick for the efficiency of a plant engineering department. Note the mirror finish being applied by this floor machine operator to floor in storage area.



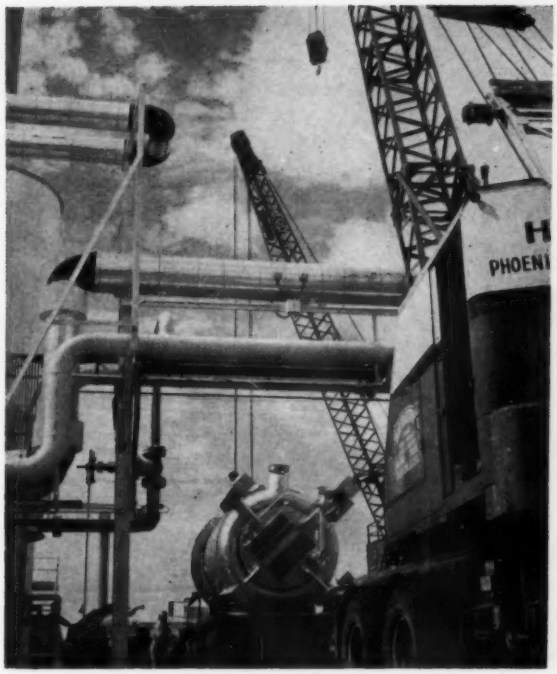


Fig. 7. This air heater has just arrived, has received an inspection and it is being loaded at the installation site.

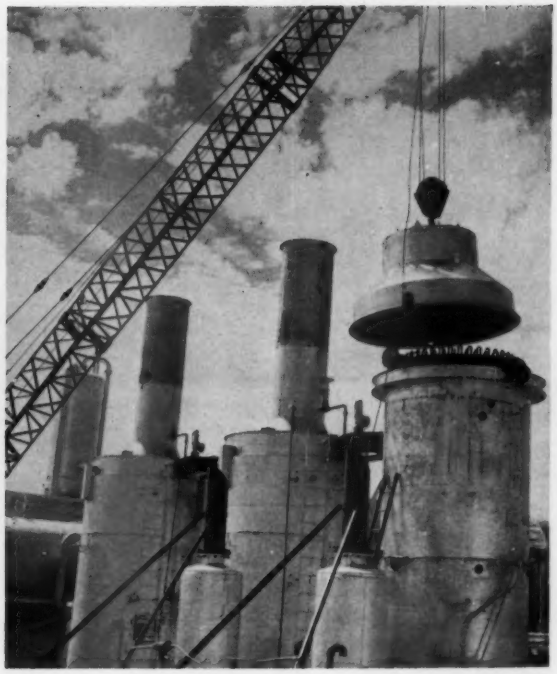


Fig. 8. Nearing the finish of a typical plant engineering project. This photo shows the "roof" being put on heater.

test facility for instance, the plant engineering department first develops the design and specifications for the job, then sends this information to the purchasing department along with a request for bids. When the bids come in, the plant engineer reviews them carefully (in cooperation with management on very large projects), taking into consideration delivery date, the reliability of the bidder, etc., as well as price. After selection of the bidder is made, recommendations are made to purchasing for award of the contract.

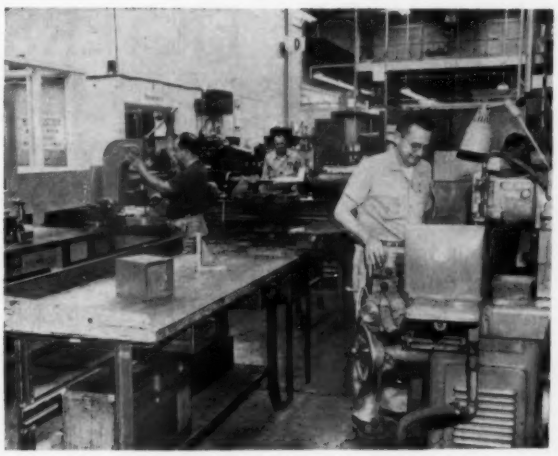
Paper work in the department is held to a minimum insofar as it is compatible with good business practice. Expenditures are broken down into "Capital" or "Expense" categories, dependent upon the type of work to be performed. The plant engineer can authorize expense expenditures up to $250 without consulting management. Larger expenditures require management approval. The same applies to most capital expenditures.

When a plant engineering expenditure is to be made, an AFE (Authorization for Expenditure) is made out and forwarded to the accounting department along with a suggested charge method (Capital or Expense item) from the plant engineer. The accounting department reserves the right to alter the suggested charge method if it will affect taxes, or if the cost of the item can be most effectively amortized over a period of time.

Nielson points out that all AFE's originating in the plant are channeled through him. "We become involved in at least 90 per cent of all of them," he said. When an AFE originates in a specific department, it must carry the supervisor's signature, and is sent first to the plant engineering department for approval. If the AFE is for more than $250, the usual consultation with management is held. If it is for less than $250, plant engineering personnel proceed automatically with the job after it has received the plant engineer's approval.

LaMar Nielson points out that many ideas for plant improvements originate in the plant engineering department itself, without instigation from the various department heads. "Due to our safety and insurance programs, in conjunction with our regular duties, we are very close to what is going on at all times. Many times plant engineering personnel will note where improvements can be accomplished, and will suggest them to the controlling departmental supervisor. In most cases, such suggestions are gratefully accepted. Here again our specialized technical knowledge gives plant-wide benefits." **End.**

Fig. 9. Partial view of the plant engineering machine shop.



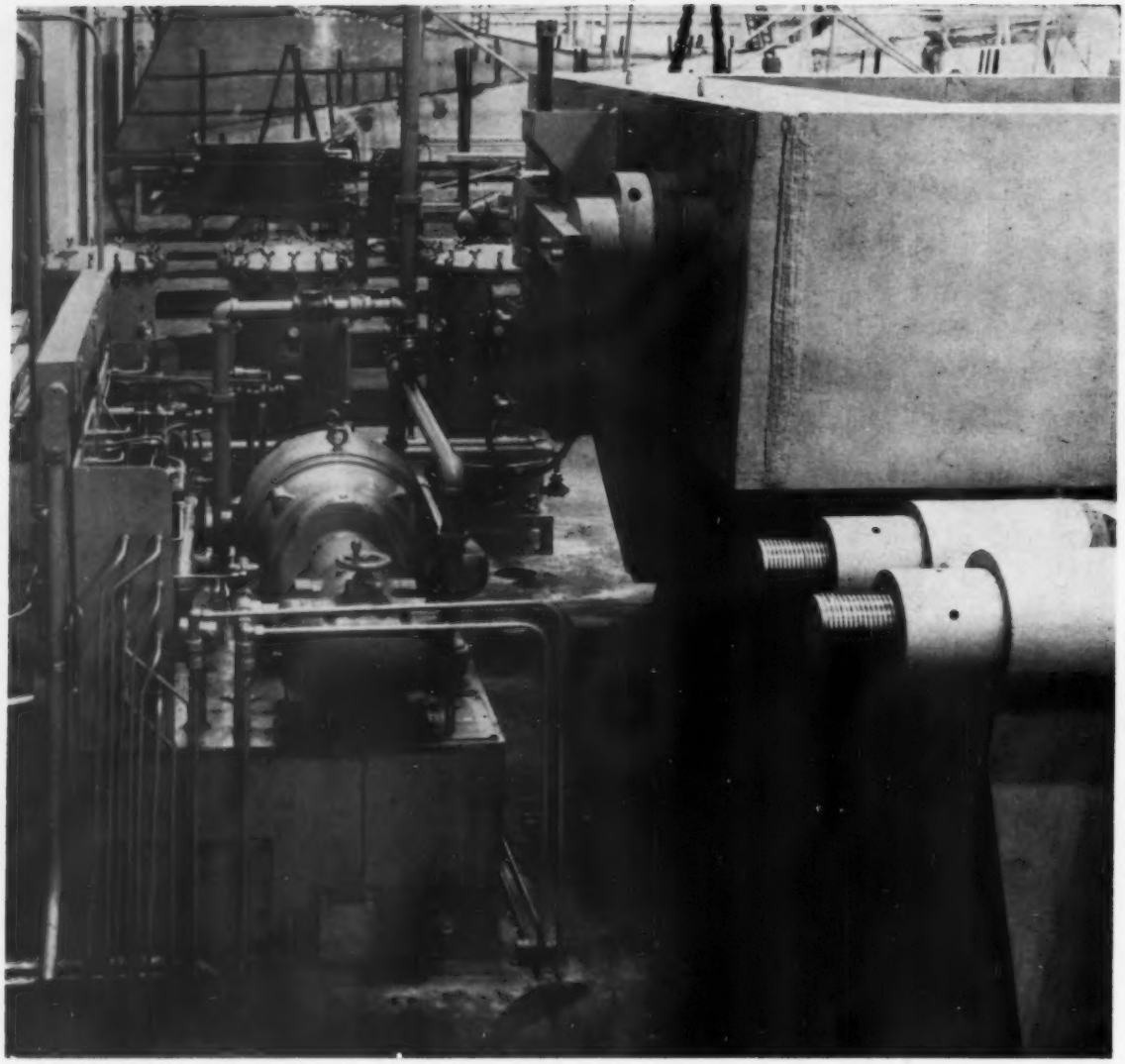


Fig. 1. This is the unit that pumps the filtered oil back into the press system. Superchargers are visible behind pump.

HOW OIL FILTERS SAVED SERVOS

12 Valve Changes Daily Cut to Zero for 16 Months

MANY INDUSTRIAL plants throughout the nation have been experiencing trouble in the use of high precision, electrically actuated, hydraulic servo valves. In many cases, the reliability of the servo valve itself was suspected. This was because the actual cause was invisible. In a majority of cases, the trouble was generated by a microscopically thin film of contamination on the valve spool caused by the use of unfiltered hydraulic oil.

A typical example of this invisible trouble occurred at the Long Beach, California Division of Douglas Aircraft Company when electrically actuated hydraulic servo valves, with a spool tolerance of some fifty millionths of an inch, were installed in the closed-loop electronic-hydraulic control system on the big Sheridan stretch press used to form wing sections for the DC-8 jet airliner.

Initially, as many as 12 valve changes a day were necessary. The valves would operate for a short period, then begin to slow down and stick. This was intolerable in a huge stretch press with eight hydraulic cylinders working on a wing skin section worth $3200; a part

which could easily be ruptured or ruined by uneven cylinder pull. When maintenance personnel disassembled these sticking valves, they could see nothing wrong with them. Washing them with the usual cleaning solvents had no effect. Finally paint remover was tried as a wash, and to everyone's surprise, when the valves washed in paint remover were reassembled, they worked perfectly.

However this ability to re-activate the valves did not remedy the problem of excessive press downtime required to make the numerous valve changes. Nor did it minimize the danger of a momentarily unnoticed sticking valve causing injury to the part being worked.

The ability to clean the valves with paint remover proved quite conclusively that the invisible film of contamination causing the trouble was of a gummy lacquer composition. It is also known that these gummy lacquers will form in unfiltered hydraulic oil caused by oxidation acting in conjunction with other contaminants. It was obvious then that the solution to the problem was installation of a highly efficient hydraulic oil filtering system which would remove the contaminants causing the gummy lacquer films to form, and would keep the hydraulic oil in its original condition.

Acting on this solution, the Facilities Engineering Department at the Douglas Long Beach Division obtained three filter pots from Briggs Filtration Company of Washington, D. C. Each of these pots contain 16 filter elements. Capacity of the system is 50 per cent greater than pump requirements for forcing hydraulic oil into the eight cylinders on the big press. Thus any two of the filter pots will keep the press in operation while the third is being recharged with filter elements, or is receiving other repairs.

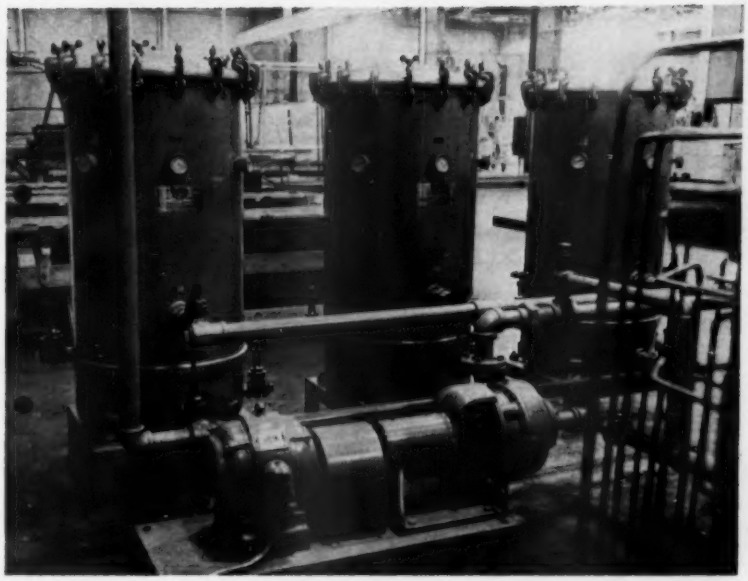


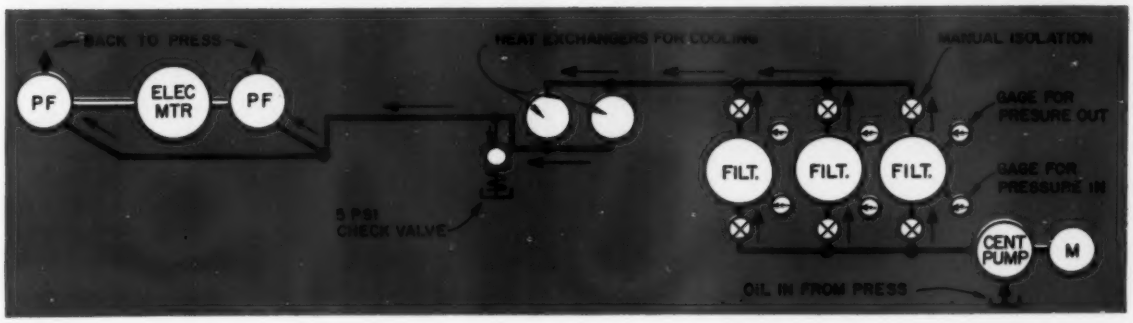
Fig. 2. These are filter pots, and pump used to force hydraulic oil into pots.

Flow pattern of hydraulic oil through the system was changed to incorporate this filter system to the best advantage. The oil now flows directly from the press cylinders into the filter system. After being filtered, the oil passes through a cooler, then down into a supercharger and from there into the pumps, from where it is again pumped back into the press cylinders. The pumps were cut off from the hydraulic oil supply reservoir so that no unfiltered oil could enter the system. Additions are now made prior to the filters.

Long life filter elements are used. Those now installed have been in operation for 16 months, with two years considered to be their normal service life. A very high order of filtering efficiency is obtained, with a 2 micron 100 per cent filtration for dirt, and 100 per cent acid correction.

But the really big surprise came in valve operation after installation of the filtering system. Valves that once had to be changed up to 12 times a day, have now been in constant operation for 16 months, and have caused no trouble. Machine downtime for valve replacement has been cut accordingly. **End**

Fig. 3. Simplified diagram of the filtering system only. Each filter pot contains 16 cartridges with 2 micron removal of solids and 100 per cent acid correction at total flow rate of 74 gpm through the filters. Flow rate per cartridge is approximately 1½ gpm. Main pump inlets are supercharged. Cartridges are combination celluose and molded block Fuller's earth.



SHIELDING OF DANGEROUS RAYS
Two Firms Use Structures With Massive Doors

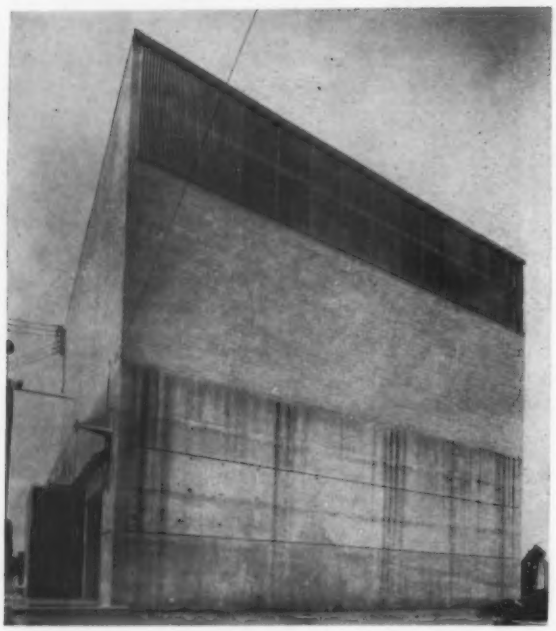


Fig. 1. Heavy walled structure for gamma and x-ray work.

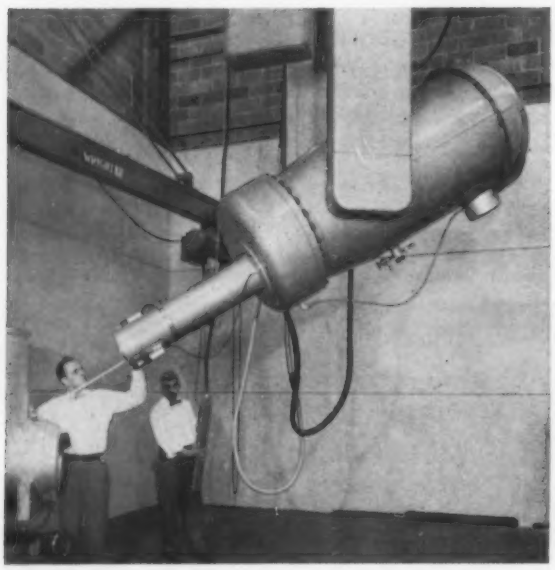


Fig. 2. Castings are X-rayed at a 36-in. fixed focal distance.

UP TO A RELATIVELY SHORT TIME ago, the steel casting and the R-P&C divisions of American Chain & Cable Company, Inc. were hindered by the lack of high voltage X-ray equipment and the continued use of a low energy source of cobalt 60. Consequently, they were only in a position to gamma-ray those castings of utmost importance.

A preponderance of large-sized pressure seal valves forced extra loads on the radiographic department and necessitated their being sent out to commercial laboratories for X-ray inspection. This was expensive and caused delays in the delivery of finished products to customers.

A long term viewpoint was taken in making the decision to invest in a complete and modern non-destructive testing installation, capable of making X-ray and gamma-ray inspection quickly. Prior to the final decision the following factors were considered: 1. Safety to personnel. 2. Speed. 3. Definition. 4. Acceptability of results by customers.

For safety, plant personnel must be as far away from active radiation as possible or be protected by lead or concrete of sufficient density. Speedy penetration can be attained either with a high Curie source of cobalt 60 or an X-ray machine of high enough voltage for checking relatively thick sections of steel. Definition is a matter of distance and type of film, and is coupled with many other factors to obtain the necessary two per cent sensitivity required by a boiler code or other governing bodies.

To shield the highly penetrating radiations from the X-ray machine and the radioactive cobalt, the firm had to comply with city, state, and Atomic Energy Commis-

Fig. 3. Cobalt 60 pellet is moved automatically to tube's end.

sion codes for safety and health. The structure which was finally built, close to the main foundry and mill, is impressive in its own right. It is a massive building with high-density concrete walls, measuring 4 ft in thickness, enclosing the area housing the X-ray generator. See Fig. 1. These walls are capable of absorbing the radiation generated during exposures. Access to this part of the building is through an opening which is closed for testing by a motor-driven door, also 4-ft thick, and weighing approximately five and a half tons.

The gamma-ray portion of the building has walls of 2-ft thickness and is equipped with its own motor-driven door weighing in the neighborhood of 2¼ tons. Winding corridors designed to prevent radiation exposures permit passage from one section of the building to the other. The entire building was built on a solid concrete foundation resting on 47 piles driven 25 ft down to solid rock.

To facilitate the processing of all exposed films, lower operating costs and promote efficiency, the films are developed and interpreted in the same building where a complete darkroom, control room and viewing room have been constructed behind the complete safety of 4-ft thick high density concrete walls.

Using the proper equipment, such as the modern high voltage generator having a two-million electron volt potential, the 10 Curie source of cobalt 60, the modified bridge cranes of 7½- and 3½-ton capacities, and all of the accessories that complete this setup, the firm's personnel can easily check a large quantity of castings. Average exposure and setup time ranges from 5 to 7 minutes per casting. **End**

Door Details of W-K-M's Plant Engineered Facilities

INSPECTION of steel valve and fittings castings is accomplished at the Missouri City, Texas, Valve Plant of the W-K-M Division of ACF Industries, Inc., by the use of radioactive cobalt 60. Utilization of this radioactive material created the problem of designing adequate shielding to protect personnel from the harmful effects of gamma rays emitted when the radioactive source is exposed.

The problem was solved by constructing two inspection cells having 20 ft by 20 ft inside dimensions with 8 ft high walls of 2½-ft thick reinforced concrete. A 1/16-in. thick lead lining was provided on the inside surface of the walls to prevent reflection of rays which would cause clouding of the radiographic film.

Entrance into the cells is shielded by two huge reinforced concrete doors. Design of the doors and their operating mechanisms is the outstanding feature of the testing facility. Each door is 2½-ft thick and weighs approximately 70,000 lb.

To facilitate ease of construction, the doors were poured flat and later raised to an upright position. Reinforcing consists of three No. 9 bars at the top of door, three No. 10 bars at bottom, and mats of No. 4 rods on 6-in. and 12-in. centers at the outside and inside

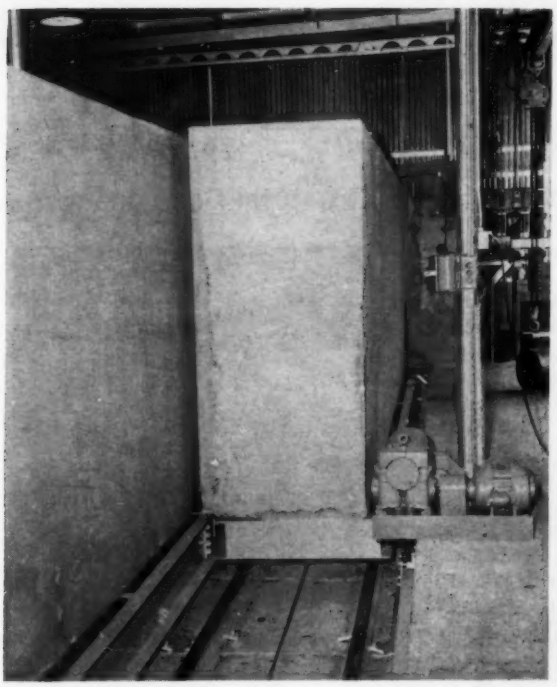


Fig. 1. Crane wheels help move door weighing about 70,000 lb.

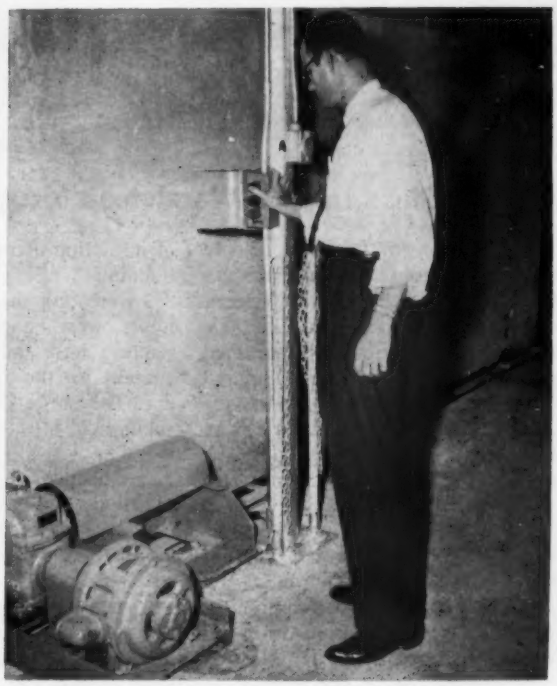


Fig. 2. The drive motor is energized through reversing switch.

Fig. 3. Floor grating is moved out of way as door is closing.

surfaces respectively. Lifting eyes were cast in the doors to provide a place for attaching cables during erection.

After a suitable curing time, two 20-ton motor cranes were used to position the doors on their carriages, which resemble bridge crane end trucks. The carriages are supported by standard 15-in. double flanged, roller bearing equipped crane wheels rolling on 60-lb ASCE track. The tracks are recessed approximately 18 in. below floor level to allow for overhang at the bottom of the door thus preventing harmful rays from escaping beneath the doors. See Fig. 1.

Door Movement

Movement of the doors is accomplished by a relatively simple operating mechanism driven by a 2 hp 1200 RPM electric motor. The motor is coupled to a worm gear reducer with an output speed of 17 rpm, or a reduction of approximately 71:1. The output shaft drives a 3⅜-in. diameter grooved cable drum. Rotation of the cable drum in either direction results in a length of 5/16-in. hoisting cable being wound up on one end of the drum at the same time a similar length is being unwound from the other end. Since the cables, after going through a system of sheaves, are attached to opposite ends of the doors, any rotation of the drum causes a linear movement of the doors. The doors move at a speed of 15 fpm. A reversing switch permits the use of the same motor for both opening and closing the doors. Final movement of the doors in either direction is stopped by limit switches.

Locking devices were installed at the push button station for each door to prevent a chance opening of the doors while the radioactive source is still exposed. As an added safety feature, each cell is equipped with a monitoring system which provides a gamma ray detection tube at each door. If a door is opened with the radiation concentration above safe limits, an alarm sounds to warn the operator of the harmful condition.

Fork lift trucks bring material into or out of the cells over a steel bridge across the wheel track recess. A 1-ton bridge crane is utilized to position the bridge across the recess. Personnel walkways are also provided to make entry into each cell possible without installing the heavy bridge. These walkways lower as the doors are opened, and automatically fold up against the wall as the doors are closed. The walkways are lifted by a linkage arrangement which is actuated by a door as it closes. See Fig. 3.

All weather operation of the facility was made possible by the erection of a structural steel, galvanized sheeted, structure over the cells. This structure measures 47 ft by 43 ft by 14 ft.

The entire inspection facility was designed and engineered by the W-K-M Plant Engineering Department under the direction of A. E. Bleimeyer, Plant Engineer, and C. L. Harman, Assistant Plant Engineer. Maintenance personnel provided all the necessary labor with the exception of that required to pour the 250 cu yards of concrete which went into the construction of the cells. **End**

Cellular Glass Used in Warehouse Insulates, Acts as Structural Component

BY USING A NEW concept of cold storage warehouse design, Plymouth Cold Storage of Plymouth, Wisconsin not only realized a considerable saving in building cost but obtained more storage capacity as compared to another type of construction.

To construct this building, a 6-in. thick concrete floor was laid. The prefabricated building framework was then erected.

Since the building would not be used as a freezer, the floor was not insulated but wall insulation started four feet below the ground level. A double layer of 2-in. by 18-in. by 24-in. blocks of cellular glass was then erected, using hot asphalt as the adhesive. The unsupported wall of insulation became the wall of the building.

In erecting the second layer, all joints were staggered and wood sleepers were imbedded to provide support for the final exterior sheeting. The entire double layer of insulation is outside the steel framework

To insulate the roof, the first layer of cellular glass was adhered directly to the steel purlins, spanning the area between them. A second layer was then applied with hot asphalt, staggering the joints. Again, wood sleepers were imbedded in the second layer. Aluminum sheets were secured over the insulation as final roof finish. **End**

Fig. 1. The wall blocks are staggered.

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Lo-X Bus Duct assures lower balanced voltage drop . . . extra current carrying capacity

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And LO-X offers these additional operating advantages. The duct has no moving parts . . . thus nothing to wear. It is prefabricated . . . adapts to any building contour. Exclusive scarf-lap joints assure rigid connections . . . speedy installation. BullDog's five-step silvering process of aluminum bus bars guarantees maximum conductivity at connection points. Special spring-type cup washers at the joints give a positive *bolted* connection.

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New Reactor Designed To Test Safety of Nuclear Operations

THE ATOMIC ENERGY COMMISSION has started up Special Power Excursion Reactor Test No. 3 (Spert III)—a versatile research facility developed for studying nuclear reactor safety. The new plant is situated at the Commission's National Reactor Testing Station in Idaho.

Spert III, constructed by Paul Hardeman Inc., Los Angeles, is being operated by the Phillips Petroleum Co. for the Commission. It is one of a series of reactors designed and developed to find basic explanations for reactor behavior under runaway conditions. All operations are conducted remotely since tests approach reactor destruction.

This facility provides the widest practical range of control over three variables—temperature, pressure, and coolant flow rate, it is expected to contribute significantly to better understanding of reactor self-limiting and instability characteristics.

A series of nuclear physics measurements leading to a special program of reactor hazards studies is now being conducted in Spert III. Pressures ranging from atmospheric to 2500 psi, and water temperatures from 68 F to 668 F are attainable. Also, coolant flow rates change from zero to 20,000 gpm, with heat removal capacities up to 60,000 kilowatts for a duration of 30 minutes.

The facility consists of a reactor vessel, pressuring tank, and two primary coolant loops, including pumps, heat exchangers and other necessary auxiliary equipment. The reactor can be operated from one-half mile away.

King-Size Proportions in Two Non-Ferrous Materials – Carbon, Nylon

THREE OF the biggest Karbate impervious graphite shell and tube heat exchangers ever made are installed at the Beaumont, Texas plant of Olin Mathieson Chemical Corp.

Operated vertically, in parallel flow, the exchangers carry a total of 500 gpm of cooling water, in the recovery of acid from refining sludge. Built by the National Carbon Co., Div. of Union Carbide Corp., the exchangers consist of 45-in.-diameter outer steel shells, each containing 685 graphite tubes 12 ft long and 1¼ in. in outer diameter.

TWENTY-ONE feet long, weighing over 700 lb, a nylon cylinder has been produced by the Polymer Corp., Reading, Pa. The cylinder has an outside diameter of 16 in. and a 13-in. inside diameter—a record monolithic shape.

Intended primarily for use as roller covering in the embossing and coating of paper, textiles and other sheet materials, the large-diameter nylon cylinders can be used as journal bearings, tires for industrial materials handling equipment and as housings for circuit breaker equipment.

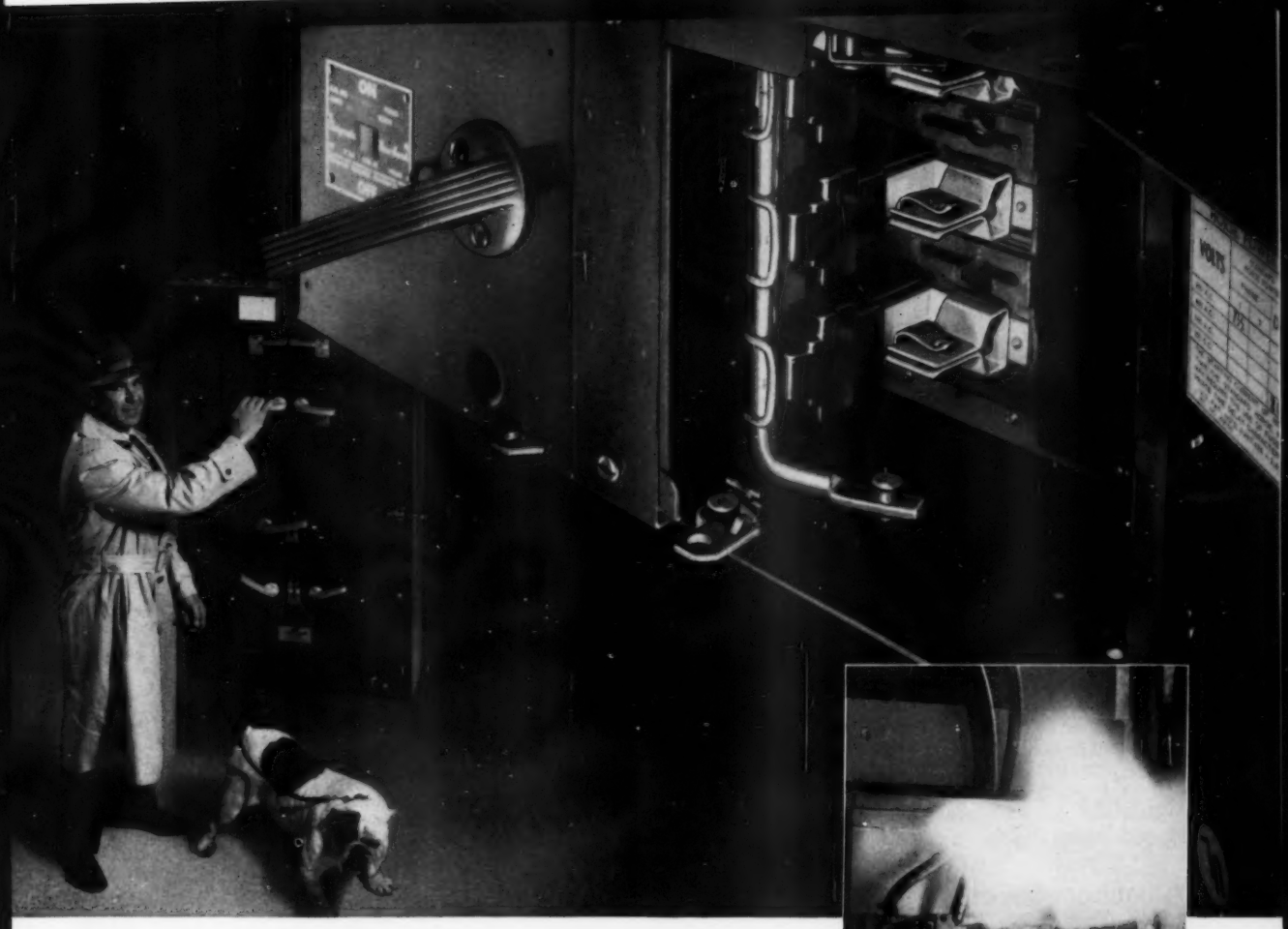
World's Biggest Aluminum Crane Rated at 150-Ton Capacity

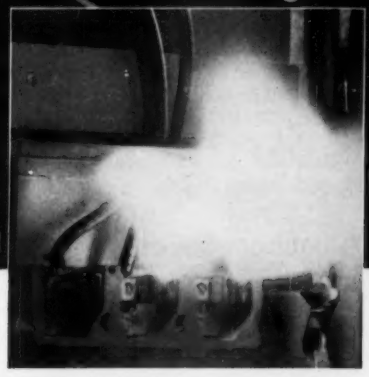
IMPORTANT PARTS of the current 65-million-dollar expansion program at Reynolds Metals Company Alloys plant near Sheffield, Alabama are the aluminum cranes being installed in the buildings.

This giant, more than 50 tons lighter than a steel crane of equivalent strength, permits a corresponding saving in the cost of building supports and structural members.

The 150-ton rated capacity crane has an overall width of 32 ft and an 80-ft span. Construction engineers, who used the crane to lift a 200-ton rolling mill housing, said that the crane had only a fraction of an inch momentary deflection during the lift.

Fabricators of the crane, the Milwaukee Crane Div., Industrial Enterprises, Inc., used aluminum alloy plate in thicknesses of one-half inch and 2½ inches.





Dangerous flash explosion occurs at instant of "break" in open knifeblade switch . . . causing blades to burn, pit, deteriorate. (This photograph and the one below are unretouched.)

FOR SAFETY'S SAKE, BUY VACU-BREAK POWER PANELS

Here are some basic facts why BullDog Power Panels with Vacu-Break* units are tops in safety and performance. Vacu-Break design minimizes destructive arcs because contacts are housed in compact chambers that extinguish the arcs immediately. Result: maximum safety . . . virtually no pitting or burning of contacts . . . minimum maintenance. Vacu-Break switch units are "quick-make, quick-break" with an interlocking safety mechanism. Contacts are *directly* attached to operating handle. No tricky toggles or springs. You get positive, safe switching always. And when the handle is in OFF position, you *know* the switch is *off!*

The Clampmatic* design provides clamped-pressure switching contacts to prevent overheating at these points. Needless heat-generating areas are eliminated because there are no hinged, current carrying parts . . . and all conductors are silvered. BullDog switches also withstand severe fault currents. In recent tests, standard BullDog switches with Amp-Traps** were subjected to a 100,000-amp short circuit current. *They were undamaged!*

For safety's sake—and superior performance—specify BullDog Vacu-Break Power Panels

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BullDog Vacu-Break chamber smothers arcs before they can cause damage. Both are 100-amp, 600-volt switches, operating under 90-ampere, 440-volt load with 40% to 50% power factor.

BULLDOG

BullDog Electric Products Company, Division of I-T-E Circuit Breaker Company, Detroit 32, Mich. *BullDog Export Division:* 13 East 40th St., New York 16, N.Y. *In Canada:* BullDog Electric Products Co. (Canada) Ltd., 80 Clayson Rd., Toronto 15, Ont.

*Vacu-Break and Clampmatic are registered trademarks of the BullDog Electric Products Company. **Amp-Trap is a registered trademark of the Chase-Shawmut Company.

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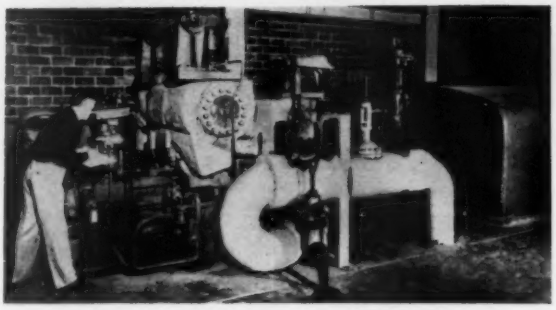
Double-Extraction Turbine, Intricate Controls Tame Demand "Swings"

AN UNUSUAL NEW TURBINE and an intricate control setup designed and built by De Laval Steam Turbine Company, Trenton, N. J. is providing efficient, economical power for a new pulp mill.

Short on available power sources, Thurso Pulp & Paper Co. Thurso, Quebec, planned a turbogenerator set for its new 200-ton-per-day bleached kraft pulp mill. Major design conditions included: wide shifts in electrical load from weekday to weekend, summer to winter, varying in a ratio of 10 to 1; periodic, instantaneous drawdowns of 60,000 to 100,000 lb per hr from a total steam capacity of 300,000 lb per hr for process use.

Unique feature of the turbine is its restricted exhaust end designed for a generator load of 2000 kw instead of 7500 kw rated full load. The turbine has two extraction points—one uncontrolled at a rated 135 psig, the other controlled at 40 psig. With the 135-lb opening closed and the 2400/4160-volt generator operating at full load, maximum controlled extraction at 40 lbs is 170,000 lb per hr. When uncontrolled 135-lb extraction reaches its rated maximum of 36,000 lb per hr controlled extraction drops to 135,000 lb per hr for a 6700 kw load.

A power boiler (200,000 lb per hr) in parallel with a recovery boiler (100,000 lb per hr) supplies steam at 450 psig, 710 FTT. These boilers supply not only the turbine but also the paper machine, sawmill, 125-lb and 40-lb reducing stations, and boiler auxiliaries.



Full drawdown by the pulp mill digesters creates such an excessive demand for steam at the uncontrolled extraction point that the turbine would not be able to carry full electrical load. To prevent this from happening, a pneumatic position transmitter, linked to two servomotors, signals the pressure reducing station in the line from the 135-lb extraction point to throttle and close this valve.

Steam for evaporators of the pulp mill, bleach plant, heating system and sawmill is drawn from the 40-lb turbine extraction point which is also connected by a header to the paper machine drive exhaust and pressure reducing station discharge.

Aluminum-Sheathed "Beehive" Houses Nuclear Reactor Test Facility

THE WORLD'S LARGEST nuclear research reactor entirely owned and operated by private industry is now operating.

The facility is the 5-million-watt research reactor of Industrial Reactor Laboratories, Inc., owned by ten of the nation's leading industrial companies. The largest privately-owned "swimming pool" type of reactor, it was erected by the ten companies to provide them with an important new tool for basic and applied research in their respective fields. Cost of the reactor and its supporting laboratories was $4,500,000.

IRL participants are American Machine & Foundry Co.; American Tobacco Co.; Atlas Powder Co.; Continental Can Co.; Corning Glass Works; National Distillers and Chemical Corp.; National Lead Co.; Radio Corporation of America; Socony Mobil Oil Co., Inc., and United States Rubber Co.

The new reactor, housed in an 87-ft-high aluminum-sheathed "beehive" of reinforced concrete, will be raised gradually to its full power potential of 5 million watts, the level at which it will be sustained for research operations. Following a series of tests and measurements, the participating companies will start using the reactor in support of their individual research programs.

The dome is constructed of 12-in. and 8-in. concrete walls on the lower portions and 3-in. gunite on the upper portion. The outside is sheathed with roofing felt, fiber glass board and a 16-gage mill-finish aluminum skin.

The reactor consists of a special concrete pool rising thirty feet from ground level within the 'beehive' dome. The core of uranium fuel is situated at the bottom of the pool, where circulating water performs a dual function of providing additional shielding and removing the heat from the nuclear reaction. A platform around the top of the pool accommodates the reactor control room and provides working space for various operations, including the handling of the uranium fuel beneath the water. Around the base of the pool are numerous facilities for experimental work, including special chambers in which materials under test are inserted for exposure.

The Industrial Reactor Laboratories center is situated on a 300-acre site in a rural area about five miles east of Princeton, N. J. In addition to the reactor in its distinctive 'beehive' structure, the facility includes adjoining laboratories and offices, and a pumping plant for the large-capacity pumps that supply the water for the reactor.

Now from Du Pont Research comes a new kind of paint that definitely *retards the spread of flame.*

Rigorous testing by Underwriters' Laboratories has proved conclusively that Du Pont Fire Retardant Paint helps answer the plea of firemen to "Find a way to give us a 5-minute jump on most fires and we can control them."

Du Pont Fire Retardant Paint is a durable, washable interior flat finish that *looks, applies and wears like regular flat wall paint.* It can be brushed, rolled or sprayed . . . comes in seven eye-pleasing colors: Sunlight Yellow, Pale Blue, Daylight Green, Light Green, Pale Pink, Guards Gray, Ivory—and White.

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For more facts circle 568 on Reply Card

NEW PLANT CONSTRUCTION —advance information on location, costs

Crossett, Ark.—Crossett Paper Mills, Inc., this city, plans major addition to paper mill located here. Plans call for the addition of a 180-ft bleached fibreboard machine room and the installation of 29 additional dryers at a reported cost in excess of $3.4 million. Rust Engineering Co., Birmingham, Ala., is the consulting engineer on the project.

Richmond, Calif.—Standard Oil Co. of California, 225 Bush St., San Francisco, plans a $2-million modernization and reactivation program for company's 20-year old hydrogenation plant at this refinery. Work will begin at once for completion late this year.

Van Nuys, Calif.—Radio Corporation of America, 30 Rockefeller Plaza, New York, N. Y., plans to construct a missile and radar center, situated on a 50-acre tract of land in the San Fernando Valley. Work on the new facility, to begin at once, will consist initially of 220,000 sq ft of floor space, including a production, an administration and three engineering buildings.

Watson, Calif.—American Chemical Corp., jointly owned by Stauffer Chemical Co. and Richfield Oil Corp., plans to construct a $7.5-million petrochemical plant on local plant site. Construction will get under way at once for completion by the summer of 1960. Major products of the new petrochemical venture will include ethyl chloride, ethylene dichloride and vinyl chloride monomer.

North Claymont, Del.—A newly formed concern, SunOlin Chemical Co., jointly owned by Sun Oil Corp. and Olin Mathieson Chemicla Co., plans to construct a urea plant at this location. Plant will have a capacity to produce about 73,000 tons per year of urea prills and crystals, under the Fauser-Montecatini process. M. W. Kellogg Co., New York, N. Y., will engineer and construct the new plant with technical assistance from the Italian firm. Construction is scheduled to begin at once at an estimated cost of between $10 and $11 million.

Augusta, Ga.—Continental Can Co., Inc., 100 East 42nd St., New York, N. Y., plans to construct a huge paperboard plant. Plant will be erected on a 2600-acre site south of the city, near the Savannah River. New facility when completed will cost in the vicinity of $45 million, with equipment. J. E. Sirrine Co., 215 S. Main St., Greenville, S. C., is the consulting engineer.

Meredosia, Ill.—National Starch Products Inc., 268 Madison Ave., New York 16, N. Y., plans a 50 per cent expansion of its vinyl acetate polymerization plant at local operations here. Plant will manufacture vinyl emulsion for use in adhesives, paints, paper and textile finishing resins and packaging materials. Addition to the plant will include co-monomer tanks and handling facilities, a new warehouse and a reactor with a capacity of 4000 gallons. New addition will be constructed by the Chemical Plants Division of the Blaw-Knox Company, 2042 Farmers Bank Building, Pittsburgh, Pa., builders of the original plant.

Ashland, Ky.—Ashland Oil & Refining Co., has announced that additional new products, including specialty jet fuels, will be manufactured by the company upon completion of two expansion projects at the company's Leach refineries near Catlettsburg. Plans include construction of an aliphatics-solvents plant at the No. 1 refinery. Existing equipment will be revamped at the No. 2 refinery to increase the capacity of the gas handling plant and increase operating flexibility.

Calvert City, Ky.—B. F. Goodrich Chemical Co., 2069 E. 9th St., Cleveland 15, O., has started construction of a fully automated chemical production unit at its chemical plant here. Installation, scheduled for completion by the summer of 1959, will be used in the production of vinyl chloride monomer.

Mayfield, Ky.—General Tire & Rubber Co., Akron, O., has selected a site in this city for its third tire manufacturing plant in this country. Plant which will cost an estimated $9 million, will be erected on an 80-acre tract on the northern outskirts of the city, and will have an initial capacity of 400,000 sq ft of floor space. Ground breaking ceremonies will take place soon and it is expected that construction and equipment installation will be completed and manufacturing begun in about 14 months.

Chalmette, La.—Bay Petroleum Corp., 1655 Grant St., Denver, Colo., has announced a modernization plan to increase capacity and quality of company's refinery located here. Capacity of the plant will be increased from 24,000 bbl daily to approximately 33,000 bbl per day. Work is already under way with completion planned for early 1960. Plans call for the installation of a 2,700 bbl per day alkylation unit, revamping of the catalytic cracking unit to increase capacity to 13,000 bbls a day, installation of a new two-stage distillation unit and the construction of crude and product tankage of 200,000 bbl capacity.

Chalmette, La.—Kaiser Aluminum and Chemical Corp., 1924 Broadway, Oakland, Calif., plans a $1-million expansion program at company's works located here. Plans include a 50 per cent increase in billet casting capacity, two new furnaces and other production facilities to add 7,500,000 lbs per month to the plant's casting capacity.

Moorestown, N. J.—Delta Star Electric Division of H. K. Porter Co., Inc., 2437 Fulton St., Chicago, Ill., plans to construct a new plant and office building on local site here for the manufacture of company products. Work will begin soon and plant is expected to be in full production by early 1960. Total construction cost about $750,000.

Rochester, N. Y.—Eastman Kodak Co., 343 State St., plans to invest about $61 million in company improvements and expansions during 1959. Company has budgeted $33 million for improvement of company's Rochester plant facilities while another $24 million was ear-marked for capital improvements at Tennessee Eastman and Texas Eastman Divisions.

Charlotte, N. C.—Geigy Dyestuffs, Division of Geigy Chemical Corp., headquartered in Ardsley, N. Y., plans to construct a new one-story, 60,000-sq ft structure of modern design to house laboratories, warehouse facilities and administration facilities of the company. New building will be situated on a 13-acre plot on Mt. Holly Rd., facing new Highway 16 and was designed by A. G. Odell & Associates. Laxton Construction Co. has been awarded the construction contract which will be in excess of $500,000.

Circleville, O.—E. I. du Pont de Nemours & Co., Inc., Nemours Building, Wilmington, Del., plans a 30 per cent expansion program at company plant here now manufacturing Mylar polyester film. Expansion will result in the facility's capacity being nearly doubled since it was opened in 1954. Construction will begin soon on plant addition to be completed sometime in 1960.

Medina, O.—Hood Chemical Co., 80 Rittenhouse Pl., Ardmore, Pa., has plans under way for the construction of a 25,000-sq ft manufacturing plant on site here for the production of cleaning chemicals. Work will begin soon at a reported cost of approximately $250,000.

Monroeville, Pa.—Koppers Company, Inc., Koppers Building, Pittsburgh, Pa., plans to construct a new research center here. Site development of a 176-acre tract near here is already under way. Construction of an administration building, three chemical labora-

(Continued on page 218)

THERE MUST BE AN EASIER WAY

EVEN THE MOST EXPENSIVE DRAWINGS HAVE A RELATIVELY SHORT LIFE
ANYONE WANT A SLICE OF PICKLE?
SHE DOESN'T FILE DRAWINGS, SHE SHREDS THEM
FOR GOSH SAKES, STOP! IT'S LUNCH HOUR!
HEY, JOE— WAKE UP! YOUR DRAWING'S ON FIRE!
IF WE HAD A BLUEPRINTER* MAKE AUTOPOSITIVE PAPER INTERMEDIATES, WE COULD KEEP OUR DRAWINGS OUT OF HARM'S WAY

Much easier for you when you have your local blueprinter—or your own print room—reproduce your drawings on new Kodagraph Autopositive Paper Translucent.

You get positive photographic intermediates directly—creases, pickle stains, bottle rings are dropped out . . . weak line detail gains surprising strength.

The main thing, of course, is that your "hundred dollar" originals are safe in the files, and you won't go blind or mad when you read "Autopositives" or prints made from them. And the cost of these intermediates is so trifling—their line detail so impervious to smudging and spilling—you won't worry a bit when lunch is served.

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Engineering Campus, McDonnell Aircraft Corporation, St. Louis. Harris Armstrong, architect; Belt & Given, mechanical engineers; MacDonald Construction Co., general contractor; T. J. Sheehan Co. and Sodemann Heat & Power Co., mechanical contractors; all of St. Louis.

Engineering "Campus" for McDonnell Aircraft Corporation

Provides Ideal Environment

Engineers

McDonnell Aircraft Corporation, a leading producer of military aircraft, missiles and components, rates its beautiful new Engineering Campus as "the most efficient and most desirable quarters that have ever been available to any company for its engineering activities."

To illustrate, a Johnson Pneumatic Temperature Control System assures McDonnell engineers of the best working climate today's air conditioning can produce. Instead of ordinary thermostats, which control the dry bulb temperature only, the specially planned system utilizes *Comfostats*, the modern humidity-compensated thermostats made exclusively by Johnson. By automatically regulating the temperature in relation to humidity changes, Johnson *Comfostats* offer maximum flexibility and accuracy in meeting comfort demands under varying conditions of room size, occupancy, use and exposure.

Even more precise regulation is provided in the Campus' bomb shelter and electronic data processing areas, which are controlled on a constant temperature and humidity basis.

For "after-hours" heating and cooling savings, *Comfostats* throughout the building may be centrally reset by groups to maintain non-occupancy economy temperature levels without humidity compensation.

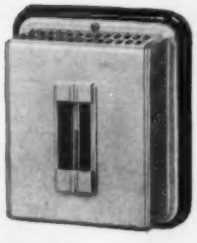
An expertly engineered control system by Johnson can help assure any building of the thermal environment best suited to its needs. When you build or modernize, have your local Johnson representative show you, your consulting engineer or architect how the advantages of Johnson Pneumatic Controls can be applied to your plant or offices. Johnson Service Company, Milwaukee 1, Wisconsin. 105 Direct Branch Offices.

GET THE "PLUS" VALUES OF PNEUMATIC CONTROLS BY JOHNSON

- **Widest Application.** Johnson Controls are applied to all types and makes of air conditioning, heating and ventilating equipment, and can meet any comfort or process requirement. Each system is engineered to meet the exact needs of the individual plant.
- **Greater Simplicity.** Pneumatic control involves far fewer and much simpler components than anything else you can use. There are fewer components to check, fewer parts subject to failure.
- **Choice of Features.** Johnson makes the most complete line of pneumatic temperature, humidity and pressure control equipment to match your needs.
- **Reliable Performance.** Johnson Pneumatic Controls are unaffected by short circuits, electrical overloads, voltage variations and humidity. You get continuous, accurate control.
- **Complete Safety** . . . even in the presence of explosive gases, solvents, dusts and other hazardous materials.
- **Dependable Service** . . . Johnson maintains the oldest and largest service organization in the industry. Full time, factory trained service men are on duty in 105 direct branch offices and over 200 other cities.

THE ONLY INSTRUMENT OF ITS KIND

The Johnson *Comfostat* controls from "effective" temperatures, regulating temperature in proportion to humidity changes. Since comfort at any given temperature varies according to the relative humidity, this humidity-compensated instrument meets modern comfort demands with greater accuracy than ordinary room thermostats, which control the dry bulb temperature only.



JOHNSON CONTROL

PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

For more facts circle 570 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

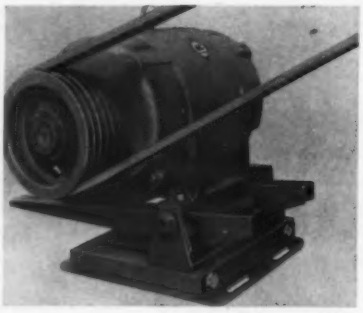
More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 221-222.

1—THERMOMETERS, dial type, for duct use

Ease of reading is stressed for these duct thermometers which feature a large legible dial and universal joint which lets the dial be swiveled and tilted to several convenient reading angles, regardless of positioning of the flange on the duct. Also, the flange has an extension neck to clear the insulation of insulated ducts. Two types of thermometers are available: a direct-mounted type for location at point of measurement, and a distant reading type, with 6 ft of capillary tubing. Thermometers are gas-filled type in which pressure exerted by the gas at varying temperatures exerts pressure on a bourdon tube. Temperature ranges available are —40 to 120 F and 0 to 160 F, both with 2-deg divisions, and 0 to 220 F with 5-deg divisions. Dial sizes are 3½ and 4½ in. Jas P. Marsh Corp.

3—TILTING MOTOR BASE for belted drive control

This reaction torque tilting motor base is for automatic belted drive tension control under changing load conditions. Available in bases to accommo-



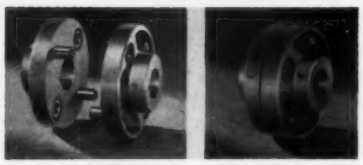
date NEMA sizes through Frame 505, as well as for special applications requiring larger frames, the new reaction torque motor bases makes possible more efficient use of space because of its compact design. Engineered on the principle that action and reaction are equal but opposite, the motor base's reactive torque is directly proportional to the horsepower. The belt tension increases and decreases as the load varies. Allis-Chalmers Mfg. Co.

4—GATE VALVES can be serviced in the line

These bonnetless gate valves, up to 2 in., are designed for complete and fast servicing and testing in the line. They feature a one-piece forged steel body and bottom guide cover designed to permit removal and replacement of wedge, stem, back seat and two screwed-in seats in a matter of minutes. More positive closing and longer life are claimed. Testing for seat tightness is by closing the valve and removing a drain plug in the bottom cover, either under full pressure or during shutdown periods by applying air pressure from a test rig. Flushing of the valve and rapid decarbonizing are accomplished by removal of bottom guide cover. The valves are available with any trim and for 600 and 1500 psi service, as well as with bodies in carbon, alloy or stainless steel. Detailed information is in Catalog 300. Velan Valve Corp.

5—FLEXIBLE COUPLINGS for direct-driven machinery

Series 400 Flexible Couplings are announced for use on direct-driven machinery where torque is not excessive in relation to shaft diameter. Based



on a design utilizing steel studs and rubber cushioned sleeve bearings, the couplings need no lubrication, company points out. They come in four sizes having from 1¼ to 2¾-in. maximum bore with standard square keys. Specifications are in Catalog 67. Ajax Flexible Coupling Co., Inc.

2—FLAT LAMPS print out letters, numbers, symbols

This method for display of numerical and verbal information utilizes plug-in electroluminescent Rayescent Lamps —thin, light-emitting plates about the size of playing cards—which display numerals, letters of the alphabet and selected symbols. The lamps require almost no power input—less than 0.2 w for the largest—and are rated for use on 240 or 460 v, 60 to 400 cycles. Expected uses include scale-and pointer applications for measurement and instrument, as well as in arrays or readout lamps to notify personnel of production requirements.

Since electroluminescent light is directly produced by action of an alternating field on a film of phosphor, the units are not dependent on a filament or a gas, or on mechanical linkages. As solid-state devices, the readout lamps age, but do not fail. New ones can be plugged in, as required, after their rated life of 3000 hr. Other characteristics announced for the lamps include extreme visibility at virtually any angle, and ability to mount in very little space. Up to 100 characters 1⅜ in. high can be displayed in only 3 sq ft of panel area. Providing power sources and auxiliary switching circuits for readout lamp installation is said to present no problems, since standard components are suitable. Because of the low power consumption by the readout lamp, switching equipment can be of conventional type. In small quantities, prices for the readout lamps and sockets range from $15 to $50. Westinghouse Electric Corp.

6—FIRE RETARDANT PAINT slows down flame spread

Approval by Underwriters' Laboratories and appearance equal to fine architectural finishes are reported for this fire retardant paint. According to announcement, this interior flat enamel does not stop fires but slows down their spreading rate, and it is totally different from paints that foam and form a spongy insulating layer when subjected to heat. The material can be applied by brush, roller or spray gun on new or unpainted surfaces. Man-

How Cincinnati Plant Stops Valve Maintenance Problem

CRANE Valves End Excessive Shutdowns for Repairs

About every four months maintenance men of Sealtest, Central Division, Cincinnati, Ohio, had to replace worn, leaky discs and thread-stripped stems of valves used on the dairy's pasteurizing tanks.

The high cost of down time, labor and parts was only a part of this maintenance problem. Each time the valves had to be repaired, the dairy suffered a drop in production and faced the possible loss of 600 gallons of milk.

Upon recommendation, Crane No. 9 bronze globe valves, with quick-change composition disc, were installed. Today—two and one-half years later—these Crane valves, opened and closed a dozen times a day, have not cost the dairy one cent for repairs, or any loss in production or milk.

Here again is proof that Crane valve economy is never measurable in terms of first cost. You get it in years of maintenance-free service.

That's why more prudent buyers specify Crane valves for every service.

LEARN WHY Crane bronze valves with composition discs are so economical for service on steam, hot or cold water, oil or gas. Write to address below for Circular AD-2222.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855 — Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

For more facts circle 571 on Reply Card

NEW PRODUCTS

(Begins on page 146)

ufacturer recommends three coats for optimum results. Seven colors and white are available. E. I. du Pont de Nemours & Co.

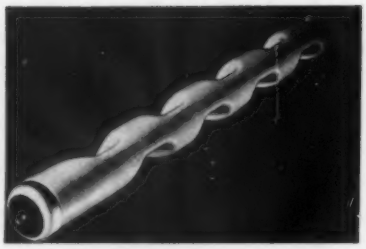
7—AIR POWERED HOISTS hook or trolley type

This new line of air-powered hoists includes link chain and roller chain models of 1000- and 2000-lb capacities, both hook and trolley type. The hoists are suggested for installations where infinitely variable hoisting and lowering speed and close load spotting control is essential, as well as in applications involving corrosive or unusually dirty conditions, or explosive atmospheres. Load spotting and variable speeds are controlled by push button pendant or pull cable control. Standard lifting speeds, utilizing 90 psi air pressure, range from 6 to 40 fpm in the 1000-lb model under full load, and 3 to 20 fpm in the 2000-lb model. An external adjustment screw on the hoist permits variance of lowering speeds. Compact in size, the hoists measure just 10½ in. long, 5 in. in diameter. A safety feature of these air hoists is the use of safety-snap hooks for the load and the hoist itself. The Yale & Towne Mfg. Co.

8—LARGE DRYERS for compressed air service

Large volume compressed air dryers are announced as having capacities to 3000 cfm to handle compressor output to 600 hp. Their purpose is to

extract both water and micronic particles and dry the air to low dewpoint quality in volumes sufficient to protect plant operations, including critical controls, tools and processes against damage by corrosion, pollution, dilution and freezing. The dryers use a triple-action desiccator designed to operate without heat, regeneration, regulation, volume loss, or appreciable pressure drop. Van Products Co.



9—FLUORESCENT LAMP with extra high output

An improved version of the Power-Groove Lamp, this fluorescent tube is announced as producing 15 per cent more light, but consuming only 7 per cent more electric power. Additional light produced by an 8-ft tube is worth $2.60 a year to the user, says manufacturer, yet the lamp price is unchanged. Increase in light output is achieved by redesign of the Power-Groove, involving alternate grooves along opposite sides of the tube, rather than along one side only. Grooves in the lamps serve to place part of the inside phosphor coating closer to the arc stream where it can be stimulated into greater light-giving activity. In an 8-ft long tube of the new design, the arc stream is forced by the grooves to travel an extra foot, or a distance equal to the arc in a 9-ft lamp.

An additional user advantage claimed for the new Power-Groove is lighter weight, as the new tube configuration permits use of thinner glass without reducing the ruggedness of the lamp. According to company, the new design will start and operate reliably in existing Power-Groove fixtures, in most cases with increased light output. In new installations, with ballasts and fixtures keyed to the improved lamp, the full 15 per cent gain will be achieved. The new lamps are expected to be available this spring, first in 8-ft lengths, later in 4- and 6-ft lengths. General Electric Co.

10—ALKYD ENAMEL for indoor, outdoor use

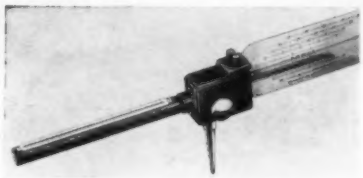
Industrial Speedenamel is announced as an all-purpose alkyd enamel for exterior and interior wood and metal application. It is adaptable for brush, spray or dip application and can be air-dried or baked. The resultant finish is said to provide a tough, flexible film with exceptional resistance characteristics. While primarily designed for product finishing, Speedenamel can also be used as a coating for general industrial machinery, and plant areas. The Glidden Co.

11—BELT DRIVEN FANS are quiet, slow speed

For use where large volumes of air must be moved at relatively low noise levels and moderate pressures, Type 'CB Fans are designed principally for wall mounting, and standard and heavy-duty shutters are available. They are also suited for use in company's Sky-Blast power roof ventilators. They come in 42-to-72 in. sizes with free deliveries from 14,200 to 58,100 cfm. Type CB Fans use airfoil section propellers; their non-overloading characteristics prevent motor overload in event of variable operating conditions, it is noted. These fans use a heavy-duty bearing assembly and the same assembly is used on all Type CB Fans of any one size, regardless of horsepower, enabling horsepower changes merely by changing motors and modifying the V-belt drives. Totally enclosed motors power these fans. Propellair Div., Robbins & Myers, Inc.

12—VIBRATION METER shows frequency, amplitude

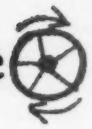
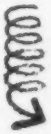
The Vibrometer is described as a light, compact, hand-held instrument of a high order of accuracy. Its applications include measuring vibration frequency and amplitude; determining direction of maximum transmitted disturbances; locating cause of unwanted noise due to resonant vibration; and measuring speeds of rotating



equipment where shafts or rotors are not readily accessible. It can also be used to analyze component frequencies of complex vibrations. Output of the Vibrometer's built-in electromagnetic pick-up can be attached to an oscilloscope or oscillograph if desired.

This versatile instrument has a reed in the form of a steel strip whose effective length can be varied by means of a knob on the side of the Vibrometer. When the reed's natural frequency coincides with that of disturbance tested, the reed vibrates in resonance. The scale marker on the handle indicates frequency. An amplitude comparator scale permits plotting of amplitude variations of the reed for different frequencies.

The Vibrometer's full frequency range from 120 to 15000 cpm is accomplished by using a weighted reed for frequencies between 120 and 600

If it rolls on an axle  or turns in a bearing or rides on a shaft if it slides in a groove or moves on a pivot if it bores  or cuts or transmits pressure one of Sinclair's 500 specialized lubricants is designed to make it work better. For answers to your lubrication problems, write today to

SINCLAIR REFINING COMPANY

Technical Service Division
600 Fifth Ave., N.Y. 20 N.Y.

For more facts circle 572 on Reply Card

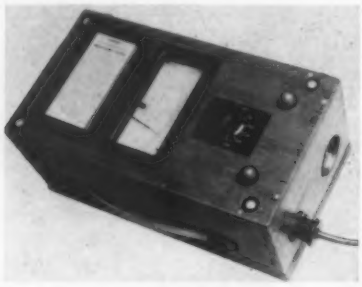
NEW PRODUCTS

(Begins on page 146)

cpm, and a free reed for those over 600 cpm. It is claimed accurate to within 10 per cent with the weighted reed, ∓3 per cent with the free reed. A calibration chart is provided for low frequencies. The Vibrometer weighs only 1 lb, is 9¼ in. long, costs around $55.00. The Korfund Co., Inc.

13—INSULATION TESTER for step voltage testing

This rectifier-operated Megger Insulation Tester is intended for making step voltage tests on insulation of electrical equipment in the higher voltage ranges . . . rotating electrical machinery rated 230, 440, 550, 2500 v a-c and d-c, wiring installations and cable with smaller conductor sizes and



insulation rated 600 v, dry type transformers, others. The instrument features a single range of 0-10.000 megohms for six voltages. Manufacturer points out that recent electrical maintenance practices indicate value of testing insulation with d-c voltages at levels somewhat higher than peak value of the rated a-c voltage of equipment being tested. The technique involves application of two or more d-c voltages and critical observation of any reduction of insulation resistance at the higher voltage. Excellent voltage regulation characteristics and high sensitivity are claimed for this instruments. The six output voltages are 500, 750, 1000, 1500, 2000 and 2500 v. Details are in Bulletin 21-20a. James G. Biddle Co.

14—SAFETY TAPE is self-adhering, guards fingers

Guardtex is a green, self-adhering safety tape for finger protection in such operations as twisting or winding wires, pig-tailing and other electrical work, and in handling sharp stampings. Guardtex is reported easy to apply and remove, to leave no sticky residue or color stain, and to conform to finger contours. Manufacturer says it preserves the natural "feel" and flexibility of fingers and will not cause maceration. Guardtex comes in white as well as green, also in white oil-resistant type. General Bandages, Inc.

15—FLOOR FINISH resists scuffs, dirt pick-up

Step-Ahead is credited with outstanding resistance to scuffing, marring, dirt pick-up and rubber marking. It reduces maintenance required to preserve a "high appearance level," says manufacturer, and is especially good for floors subjected to heavy traffic. These claims are based on the development of a substance named Polymer M, the particles of which are small and uniform in size, forming a tight, durable protective coating, and an advanced emulsifier system to assure self-leveling in the application of the finish and easy removability when necessary. Step-Ahead is applied in the usual manner and maintained with normal sweeping and damp mopping. It can be buffed to renew the shine. S. C. Johnson & Son, Inc.

16—HAMMER, absorbs impact shock, reduces fatigue

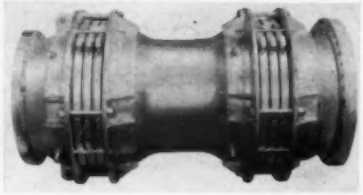
Much of the fatigue of hammer-in-work is said to be eliminated with the Shure Drive. Its head is not rigidly conneced to the hammer handle but suspended from it by elastic shocks within the head housing. These shocks,

or O-rings, are made of a resilient material having energy absorbing qualities. It is by suspending the hammer head that impact shock is minimized, company states. The hammer was designed specifically for use with manufacturer's Shure-Set, a tool which converts energy supplied by a hammer stroke into fastening power for manually fastening such hard-to-penetrate materials as thin steel and concrete. The Shure-Drive weighs 2 lb, and will be sold separately—for around $10.00—as well as with the Shure-Set. Ramset Fastening System, Olin Mathieson Chemical Corp.

Use the Reader Service Cards provided on pages 221-222 to ask for more information on these products. Circle item numbers of products in which you are interested.

17—EXPANSION JOINTS absorbs all pipe movement

According to manufacturer, these packless, corrugated-bellows units protect piping systems by absorbing axial movement, lateral deflection and angular rotation, either singly, or in any combination. They are also re-



ported to absorb unlimited amounts of laterial deflection without imposing pressure thrust on piping or equipment, making heavy structural anchors unnecessary. Basic elements of the universal expansion joints include two hydraulically-formed bellows, a center section of pipe and appropriate tie rods. They come in standard sizes from 3 to 72 in. diam and, depending on pressures and temperatures encountered, are supplied with one of three types of bellows: non-equalizing, self-equalizing or HyPTor toroidal. The units can be designed to handle medium pressures at high temperatures or medium temperatures at high pressures. Standard units are for pressure to 2500 psi and temperatures from —320 to 1600 F. Special units are available for more severe conditions. Zallea Bros.

18—ROOF MATERIAL for repair, replacement jobs

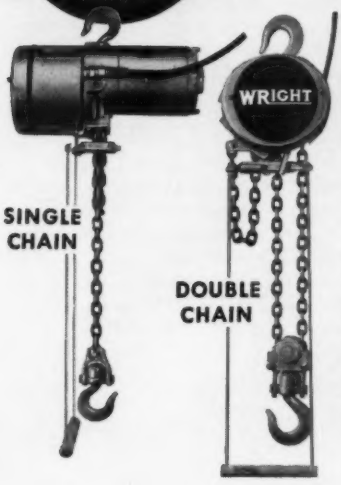
Tropiglas is made of spun glass threads, criss-crossed at random to make a tough glass mat. Because it is inorganic, it does not rot or disintegrate with age, company notes. In the built-up roof, applied by company's cold process method, Tropiglas embeds in Roofkoter, a semi-liquid coating. It is pointed out that blisters and wrinkles have no chance to form, as the glass weave permits trapped air to escape before the final coat of Roofkoter is applied. Tropiglas lies flat and follows irregularties on the roof. It can be used to form flashings. A Tropiglas roof can be applied by unskilled labor, says manu-

For more facts circle 573 on Reply Card ⟶

WRIGHT HOISTS & CRANES

ACCO

FOR LONGER LIFE • EASIER MAINTENANCE
LOWEST FINAL COST



NEW...
WRIGHT Electric Chain Hoists
LIGHT - COMPACT - RUGGED - LOW COST

Two capacity ranges as pictured—
Single Chain 300 to 2000 lbs. Double Chain 3000 to 4000 lbs.

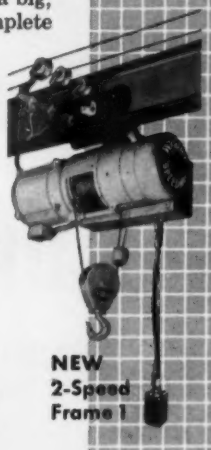
• Long Life—Safety—Minimum Maintenance are assured by these sound features: Wick Oiling of Load Chain gives a working life many times greater than dry chain...Fewest Moving Parts of any chain-type electric hoist cuts maintenance...Alloy Steel Load Chain is heat-treated for long-wearing surface, with ductile core to resist shock loads—side-pull won't break this flexible chain...Load Wheel, Hooks and Hook Couplings are drop-forged alloy steel...Precision Ball Bearings, and gears operating in oil bath, increase efficiency and lengthen life...Double Braking gives maximum Safety. Worm and Gear Drives serve as simple, positive Load Brake, and there's a big, efficient Motor Brake, easy to adjust for lining wear. For complete information, write York, Pa., for **Bulletin DH-73.**

WRIGHT *SPEEDWAYS*—Capacities ¼-ton to 10 tons
FRAME 1, FRAME 1½, FRAME 2, FRAME 3

• The New 2-Speed Frame 1 WRIGHT *Speedway* pictured here has a 2-speed motor... 1800 RPM for fast lifting and lowering...450 RPM for slow, gentle positioning of production work. It's ideal for foundries and machine shops. Capacities ¼-ton to 1 ton.

WRIGHT *Speedway* features make them your best buy for production work: The Motor Brake pictured here is an outstanding feature of WRIGHT *Speedways*. It's foolproof! No adjustment for springs or solenoid ...*Nothing to Adjust but the Cam!*

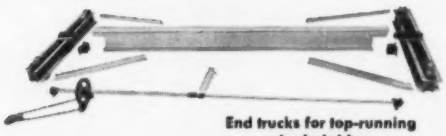
Other WRIGHT *Speedway* features: Perfect balance for smooth running...NEMA 30-minute motors for heavy-duty work...best available electric controls...heat-treated alloy steel gears, pinions and shafts have hard-wearing surface, ductile cores for shock resistance...splined connections minimize distortion...precision ball or roller bearings insure efficiency, low maintenance...gears and gear shaft bearings splash-lubricated in gear housing...Weston-type load brake ...all suspensions—lug, hook, base mountings or Timken trolleys.



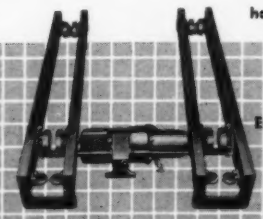
NEW 2-Speed Frame 1

WRIGHT END TRUCKS AND CRANE DRIVE UNITS
Build Better Cranes...Save Money too!

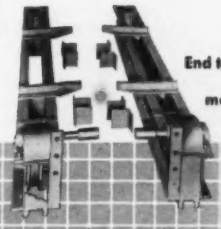
• WRIGHT Motor-Driven Cranes, Hand Traveling Cranes, End Trucks, Drive Units and Trolleys are available in a wide range of sizes and capacities to meet every overhead material-handling requirement. Write our York, Pa., office for literature and information on the equipment you need.



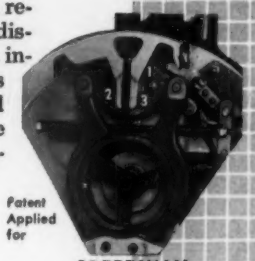
End trucks for top-running single-bridge hand-traveling cranes



End trucks and drive units for underhung cranes



End trucks for top-running double-bridge motor-driven cranes

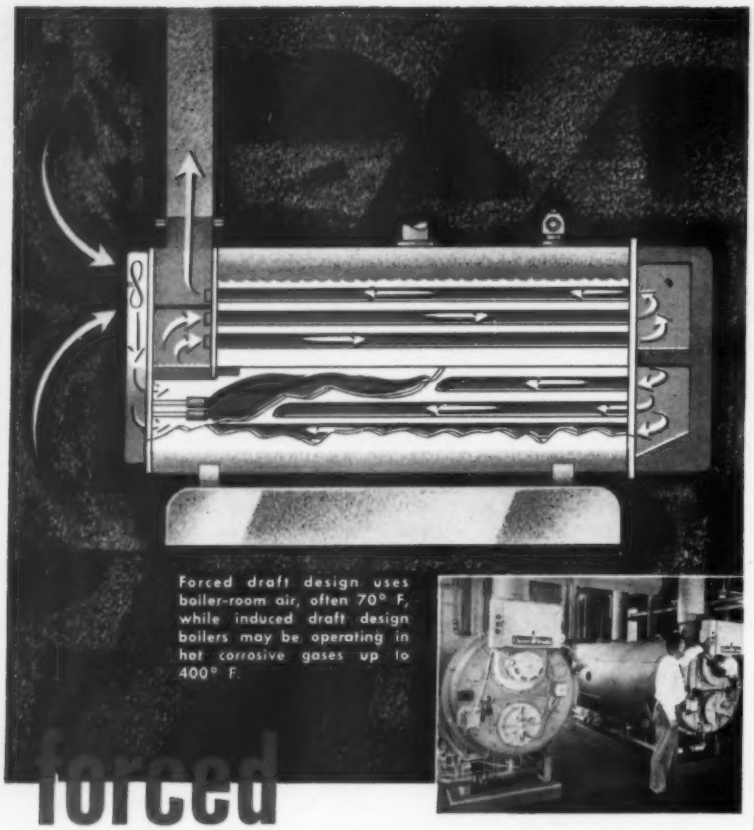


Patent Applied for

***SPEEDWAY* MOTOR BRAKE**
Nothing to adjust but the cam!

Wright Hoist Division
AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.


Forced draft design uses boiler-room air, often 70° F, while induced draft design boilers may be operating in hot corrosive gases up to 400° F.

forced draft design:

How Cleaver-Brooks packaged boilers use cool air to heat more efficiently

FORCED DRAFT DESIGN PROVIDES positive draft with a vibration-free fan, delivering cool, clean boiler room air for combustion at constant density and volume. Efficient combustion, clean fire and stable flame are assured through air-fuel ratios automatically controlled and balanced for a modulating fire, and to meet varying load demands. No high chimney or large diameter breeching are required; only a simple vent is needed.

Since the forced draft fan moves only cool, clean boiler room air, it is never exposed to the sooting and corrosive effects of hot gases; it requires little maintenance and is lower in initial cost.

4-PASS FIRE TUBE DESIGN squeezes maximum heat out of every fuel unit . . . maintains high flue-gas velocity . . . assures optimum heat transfer.

UPDRAFT CONSTRUCTION with low furnace keeps hottest gases well below water level for safe operation.

5-SQ. FT. OF HEATING SURFACE per boiler hp for top heat transfer, prolongs boiler life, assures greater efficiency and lower maintenance.

This exclusive combination of Design Standards is the key to the superiority of Cleaver-Brooks packaged boilers — 15 to 600 hp, 19 sizes, 130 models; steam or hot water; oil, gas or combination oil/gas fired; parts and service available anywhere in the U.S. and Canada.

For details, contact our representative or write Cleaver-Brooks Company, Dept. C, 364 E. Keefe Avenue, Milwaukee 12, Wisconsin.

Cleaver Brooks

ORIGINATOR AND LARGEST PRODUCER OF PACKAGED BOILERS

For more facts circle 574 on Reply Card

NEW PRODUCTS

(Begins on page 146)

facturer. The material is lightweight and easy to handle—a 540 sq-ft roll weighing less than 50 lb. Because it doesn't shrink, warp or curl, it can be rolled out to the full length of the roof, and guide lines, applied in manufacture, make it easy to slide Tropiglas into position. Tropical Paint Co.

19—LIGHT FIXTURES with color code feature

Utilization of light fixtures to help eliminate hazards and direct traffic and work flow is possible with Kolorkoded Wyteliner Industrial Luminaires. The color coding is achieved by means of color inserts in the luminaires. Those with red inserts are used

to identify exits and fire protection equipment; those with green to identify general aisles, traffic lanes and other safe through-passageways; and those with yellow to identify stairs, curbings, dead ends, or dangerous areas. Kolorkoded Luminaires can also be used to identify specific operations or to designate particular plant areas. The fixtures incorporate a drop-design end plate and are for 430, 800 or 1500 ma operation. The 800 ma units use HO lamps; the 1500-ma fixtures use VHO, SHO or Power Groove lamps. Reflector units come in white porcelain enamel baked-on white, or Alzak aluminum. They are available with 10 or 25 per cent uplight and with 13 or 27 per cent shielding using T-12 lamps. Edwin F. Guth Co.

20—ELEVATOR CONVEYOR for fragile bulk loads

Among features of the Econ-O-Lift is a spacing device which moves trays together into an interlocking bank at the loading point. This action is designed to permit fast, continuous bulk loading into the trays of such materials as candy, baked goods, cereals, plastics, glass, electronic parts, chemicals etc.—without spillage between trays. Feeders aren't required and loading is claimed quick and sanitary and without damage. After passing the loading point, the trays are separated again, providing spaces between trays for their horizontal travel, even when elevating, declining or on turns. There is no tilting, it is noted. When the trays reach the unloading area, the

For more facts circle 575 on Reply Card ⟶

New kind of fire-resistant ductwork

for people who don't like big maintenance bills

Plastic ductwork like this can keep corrosive fumes and smoke from chewing a big hole in your plant budget.

It's strong, light in weight, simple to install—and is outlasting other materials by sensational margins in the most corrosive kinds of service.

In a textile dye plant, for example, other duct systems—even with special lining—failed in 14 months or less under the combined assault of wet chlorine, hydrogen bromide, hydrochloric acid, and organic solvents. Plastic ducts like this were installed—and have lasted more than four years without repairs and without a sign of deterioration!

There's no fire hazard with these ducts, either. They're made of Hetron® flame-resistant polyester, reinforced with fibrous glass. Subjected to severe flame-spread tests, this plastic proves far safer than many common building materials. It's designed to meet stiffest code requirements. It can't ever contribute to a blaze or cause one to spread.

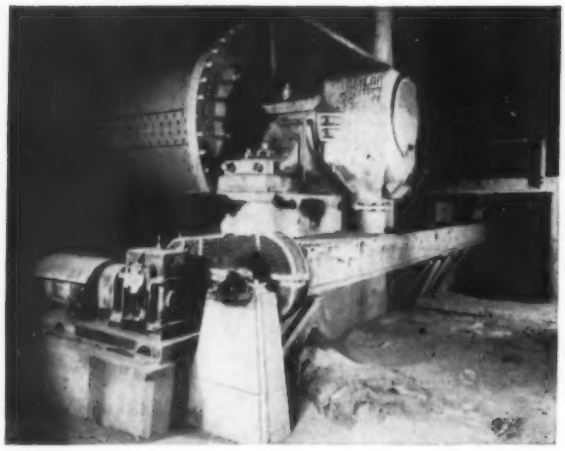
To really whip corrosion, you can get hoods, tanks, stacks, trays, scrubbers, and fans in sizes to 36,000 cfm—as well as ducts—all made of tough, fire-safe Hetron. We make the Hetron resin only. For names of fabricators who supply the ducts and other equipment, write us.

DUREZ PLASTICS DIVISION
HOOKER CHEMICAL CORPORATION

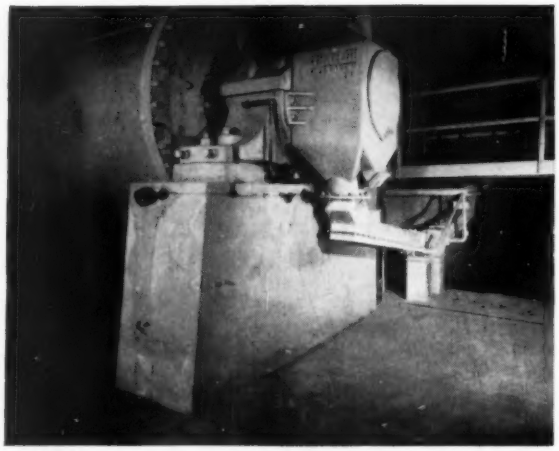
3903 Walck Road
North Tonawanda
New York

HOOKER CHEMICALS PLASTICS

The Arithmetic of Materials Handling



BEFORE: **Dirt, noise and mechanical breakdown** were constant problems in this cement plant, where two mechanical conveyors were used to collect raw materials. A 5 h.p. motor driving auxiliary equipment wasted valuable space and power, required frequent maintenance. Spillage clean-up wasted costly man-hours.



AFTER: **Clean, simple, quiet.** Notice the difference two 8" F-H Airslide® fluidizing conveyors have made. No dangerous moving parts. Nothing to lubricate. Auxiliary equipment and foundations are gone. Power needs are now only ⅛ of previous needs. Fluidizing saves wear and maintenance.

AIRSLIDE® Fluidizing Conveyor

minimizes material loss . . . maintenance . . . moving parts

If you are now handling dry, pulverized materials, the F-H Airslide Fluidizing Conveyor can help you stop noise, and air-pollution, as well as speed flow and reduce maintenance cost.

Simplicity Itself

F-H Airslide conveyors fluidize dry, pulverized materials with low pressure air.

These materials literally flow at high speed, down the inclined conveyor. Power requirements are small.

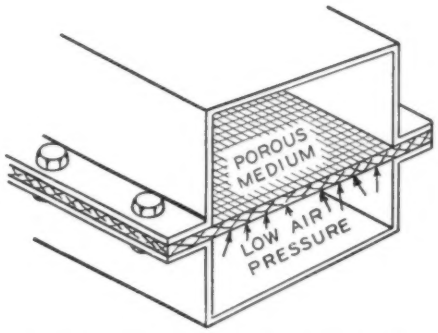
Flexibility, Low Cost

For unlimited applications, Airslide conveyors take up little space, and can be used singly and in combination with other Fuller pneumatic conveying systems. The movement of fluidized material can be around corners, between floors, through walls—nearly any conveying distance.

Better Housekeeping

Can Fuller conveying systems help eliminate your housekeeping problems—cut your maintenance and handling costs? Write today, outlining your problem in handling dry, finely-divided materials. Fuller will gladly make appropriate recommendations.

"Pulverized Materials Flow Like Water!"



FLUIDIZING PRINCIPLE: Porous supporting medium divides conveyor section into two "compartments". Dry material flows down inclined conveyor, fluidized by low-pressure air entering beneath porous medium.

FULLER COMPANY GENERAL AMERICAN TRADE MARK

Fuller ....pioneers in harnessing AIR

FULLER COMPANY
138 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
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4483
FH 59

"See Chemical Engineering Catalog for details and specifications".

For more facts circle 576 on Reply Card

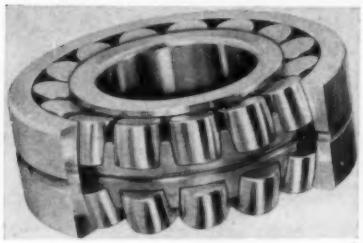
NEW PRODUCTS

(Begins on page 146)

load is dumped by automatic action, and then trays return to horizontal position. Econ-O-Veyor Corp.

21—ROLLER BEARINGS, self aligning, high capacity

Three major design improvements have been combined to produce the highest capacity spherical roller bearings, according to manufacturer. These features are maximum diameter and quantity of convex rollers for each bearing size, centrifugally-cast bronze retainers, and high, heavy



inner race shoulders. The new spherical bearings are being introduced in Series 22200 and 22300, in bore sizes from 1.5748 to 11.0236 in. with dynamic load ratings to 288,000 lb. The bearings will also be available in pillow blocks in bore sizes from 1-7/16 to 10 in.

According to company, each of the improvements contributes basic performance advantages. As each bearing contains the maximum number of the largest diameter convex rollers, the new bearings have the highest capacity of spherical bearings, it is pointed out. The bronze retainers are said to assure smooth, quiet bearing performance even under extreme speeds and loads. The higher, heavier inner race shoulders make it possible to assemble or remove bearings from shafts with conventional shop equipment. Book 2760 describes the bearings. Link-Belt Co.

22—BURNER SYSTEM for automatic boilers

Applicable to new and existing models of this company's Powermaster line of packaged automatic boilers is a steam-atomizing burner system which permits use of the heavy, low-cost fuel oils, such as Bunker C and No. 6 The system uses steam from the boiler at approximately 40 psi to break fuel into a fine mist for firing. During start-up, air atomization is used until sufficient steam pressure has been generated. It is pointed out that there

NOW···GLOBE OFFERS···
two new INTERCHANGEABLE trays for support of cables, wiring and tubing

★ Engineered for uniform design and easy installation
★ Steel or aluminum construction
★ Complete accessories for SPEEDIER Installation
★ No sharp edges to damage cables
★ Complete interchangeability

Now, for the first time, two types of cable trays, one a ladder type and the other a basket type, are available to be used INTERCHANGEABLY at any given location, depending on the type and weight of the cables to be suspended. The advantages of each type tray can thus be used to the fullest extent. Globetray, the ladder type, is intended for use where festooning is not a problem, while Cable-Strut, the basket type, is intended for the support of communication wire, instrument tubing and control cables in automation applications.

These two cable trays have been thoroughly field tested in hundreds of large industrial installations, in new plant construction, in power plants, in modernization, and for power distribution in all types of manufacturing processes. A new catalog, just off the press, gives full information and installation techniques. Ask for your FREE copy today.

Distributors are to be found in all principal cities—consult the yellow pages in your phone book under "Gratings" or "Conduits" for the one nearest you.

109

PRODUCTS DIVISION

The **GLOBE** *Company* MANUFACTURERS SINCE 1914

4016 SOUTH PRINCETON AVENUE, CHICAGO 9, ILLINOIS

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SEE FOR YOURSELF HOW

OSPHO®

PREPARES RUSTED METAL FOR PAINTING...

Brush or spray OSPHO directly on rusted metal. Let dry overnight.
Test the hard surface that results — the perfect base for paint.

Send for FREE Test Sample

Eliminate sand-blasting or flame-cleaning. Simply brush off loose rust and apply OSPHO on the rusted metal surface. One application *kills* the rust and provides a *sound* base for your regular maintenance paint. Rust action is stopped — paint jobs last much longer.

OSPHO is *not* a primer — *not* a paint. It is a carefully balanced phosphate chromate metal treatment which chemically changes rust (iron oxide) into iron phosphate — an inert, hard, gray surface ideal for painting.

OSPHO provides excellent coverage . . . a gallon treats up to 600 square feet. And cost is low. Available in 1-gallon containers (in cases of 4), 5-gallon pails, 50-gallon barrels. Colorless, non-toxic, non-flammable. Available through distributors.

Repeat orders over the past 16 years are proof of OSPHO's effectiveness. *See for yourself . . .*

Write Now For FREE Test Sample
(on company letterhead)
and descriptive literature

TREATS NEW METAL TOO!
When applied on new ferrous metal, galvanized iron and aluminum, OSPHO imparts a slight etch to the metal, insuring tight bond of the paint coat that follows.

ONLY OSPHO KILLS THE RUST

RUSTICIDE PRODUCTS COMPANY
3125 Perkins Avenue • Cleveland 14, Ohio

QUALITY MAINTENANCE PRODUCTS SINCE 1917

For more facts circle 578 on Reply Card

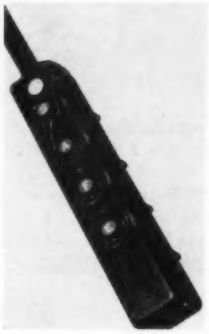
NEW PRODUCTS

(Begins on page 146)

are no moving parts in the system and the purging flow of steam keeps the nozzle clean on shutdown. Savings claimed for the steam atomizing burner include reduced electrical and maintenance costs, since the motor-driven air compressor is used only for starting. Orr & Sembower, Inc.

23—PUSH BUTTON STATION has Neoprene housing

Available in three- or four-button models, this pushbutton station has a two-piece Neoprene housing which weighs a fraction of a conventional cast iron unit, is about a third the size, and offers waterproof, rustproof and corrosion-proof construction, says manufacturer, yet it costs less than a comparable cast iron unit. Each button is an integral part of the housing and encloses the snap acting switches, protecting them from water and weather. Buttons are generous in design for easy location even by a gloved hand. A ring-shroud protects each button from accidental action from any lateral direction. Grommets are supplied with each unit to fit several cable sizes, and the interior of the unit is of roomy design for easy wiring. Applications include hoist and crane operations, suspension above heavy machinery, other areas where light, weathertight pendant-type stations are desirable. Electrical Products Div., Joy Mfg. Co.



24—SEWAGE PLANT for small installations

These sewage treatment systems can be shipped as complete plants. Two sizes of Cavitator aerators are used. Depending on design criteria, the smaller Cavitator could serve a plant of 85 employees if showers are installed, or 105 employees if there are no showers. With the larger Cavitator, a maximum of 130 and 165 (no show-

Push Operated, Detented or Spring Return.
Lever Operated, Detented or Spring Return.
Ball Actuated Spring Return.
Pilot Operated Spring Return.
Double Pilot Operated.
Pilot Operated Bucking Cylinder Return.
Single Solenoid Spring Return.
Double Solenoid Momentary Contact.

HUNT

new unique Slim Line

CONTROL VALVES

Now available with 8 types of operators. 3-way and 4-way actions. Easily manifolded into compact control centers.

● You'll like these new valves. Only 1″ thick by 3″ wide, they are exceedingly compact and light in weight; can be mounted easily on machines even when space is extremely limited.

Ideally suited for controlling small cylinders, to operate pilots and similar services. ⅛″ or ¼″ pipe tapped. Pressures to 125 p.s.i. Air, water, oil or vacuum service. Stock delivery.

Solenoid valves have the following features as standard; manual over-ride; ½″ NPT conduit connections; valve inoperative with solenoid cover removed.

The side of each valve is counter-bored, trepanned for an "O" ring, and provided with four through holes permitting up to eight valves to be manifolded together and operated from a single supply. Better get full details — now!

Six Single Solenoid Valves Manifolded into a Compact Unit Using Standard Brackets and Tie Rods.

More startling HUNT designs to come!

40 YEARS 1919 1959

HUNT

Quick-As-Wink® AIR AND HYDRAULIC CONTROL *Valves*

Send for the "SLIM LINE" Bulletin No. 581 TODAY!

Manufactured by HUNT VALVE COMPANY, 2081 East Pershing St., Salem Ohio

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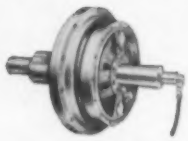
DODGE PRODUCTS you should know



AIR-GRIP CLUTCHES
Amazing sensitivity — instant response!

TAPER-LOCK STEEL CONVEYOR PULLEYS
Maximum strength with minimum weight!

DODGE TAKE-UPS
Complete range of sizes, models, sizes.

•

Write for Bulletins!

- Air-Grip Clutches—Technical data.
- Conveyor Pulleys—Technical data.
- Take-Ups—Roller, Ball, Babbitted.

DODGE MANUFACTURING CORPORATION
2700 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

For more facts circle 5[illegible] on Reply Card

NEW PRODUCTS

(Begins on page 146)

ers) employees can be handled. These capacity rates apply only to domestic wastes and do not include combined domestic and industrial waste flows. Manufacturer points out that factory fabrication offers a low cost way to provide a simple-operated waste treatment plant. Bulletin 101 gives details. Yeomans Brothers Co.

25—POSITIONER simplifies reel and coil handling

In-plant handling of heavy wire reels, sheet metal coils and other hollow-centered, cylindrical shapes is simplified with the Safeway Reel Positioner.

Positioning of reels, weighing up to 500 lb, is by means of a pedal-operated hydraulic lifting mechanism. This lift has a mechanical lock to hold the reel in any raised position for extended periods of time. The unit consists of the lifting mechanism mounted on a steel frame equipped with two fixed wheels and two swivel casters. The American Pulley Co.

26—SKIN PACKAGING protects drawings, designs

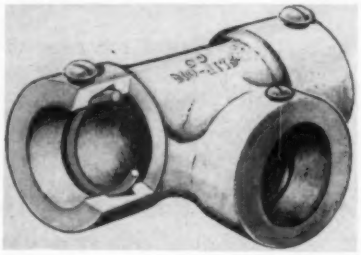
Inexpensive and permanent protection of engineering drawings and other papers is announced for this skin packaging process involving a plastic film and a simple machine, the Skin-Pak, which consists of a vacuum system and equithermo heater. It takes about 10 sec to seal an item with the film, according to company, and more than one item can be handled at a time. The film uilized is P.O.M.V. (Poly-On-Mylar Vacuum-ized). Because of the clarity of this film, original drawings can be sealed before released for blueprints or photostats. It resists grease and is impervious to moisture, dirt and climatic conditions, manufacturer states, and has a life span of over 10 yr. Grease pencil or crayon markings can be made on the film. P.O.M.V. is low in price—it costs around 1½ cents to seal an 8-by-11 in. drawing. The Skin-Pak comes in both production and desk models—can also be used to package small objects regardless of shape or bulk. Print-A-Tube Co.

27—INDICATOR checks temperatures at many points

For fast checking of temperatures at many points, the 9000 Series Multi-Switch Indicator is available with switching details that let the instrument be used for as many as 108 stations. Additional stations can be added by using an additional switch housing cabinet. The basic insrument is a self-contained, null-balance unit and requires only external sensing devices. Selector switches are three-position spring return type with double-pole, double-throw action. The indicator uses an 11-in. scale, single or dual range. Balance speeds are 2, 4 or 15 sec. Reference junction compensation is automatic. The standard reference system is a constant voltage source with standard cell and battery optional. With proper circuitry and use of transducers, other variables may be indicated. Wheelco Instruments Div., Barber-Colman Co.

28—THREADLESS FITTINGS for iron plastic pipe

These threadless, galvanized fittings in ½- through 2-in. sizes, are built around the principle that a Neoprene O-ring lodged in a wedge-shaped



groove will form a perfect seal up to 300 psi. They are said to work equally well with galvanized, black iron or standard plastic pipe. To use the fitting, you simply cut the pipe, slip on the fitting and tighten the set screws. The Slip-On Co.

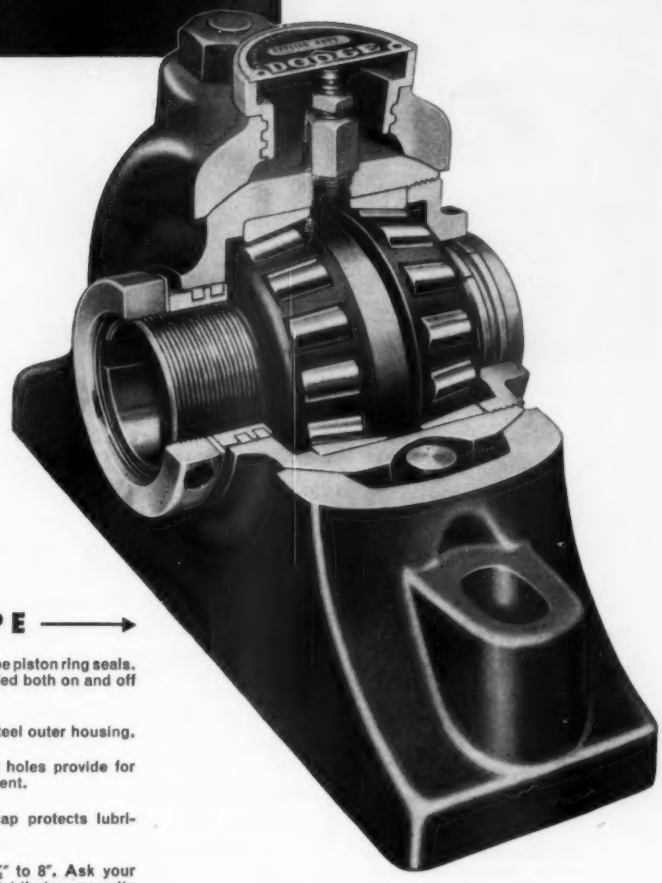
29—BEARING LUBRICATOR injects grease as needed

This low cost bearing lubricator holds a reservoir of lubricant and is designed to automatically inject grease only as required. Position of pressure cup on the unit shows the amount of grease remaining in the reservoir. Measuring 2¼ in. long by 1⅛ in. in diam, lubricator is installed, one to

DODGE PILLOW BLOCKS

WITH TIMKEN BEARINGS

America's super-quality line—with a 35 year record of keeping performance *up* and costs *down!* Five types—to fit practically any service condition. All assembled, adjusted, lubricated and *sealed* at the factory for precision performance—long life—dependability.



SPECIAL DUTY TYPE ⟶

- Designed for extreme precision and high load capacities.
- Fully self-aligning.
- Special Duplex Timken Roller Bearing with tapered bore.
- Split tapered sleeve with straight cylindrical bore extends through entire length of housing.
- Easy to mount or demount. Adapter nut (or collar) clamps adapter sleeve to shaft with extreme firmness.
- Automotive type piston ring seals. Bearing is sealed both on and off the shaft.
- Rugged semisteel outer housing.
- Elongated bolt holes provide for lateral adjustment.
- Special dust cap protects lubrication fitting.
- Shaft sizes 1⅛" to 8". Ask your local Dodge Distributor—or write us for Bulletin A670 giving complete technical data on America's most complete line of mounted bearings.

DODGE MANUFACTURING CORPORATION, 2700 Union St., Mishawaka, Ind.

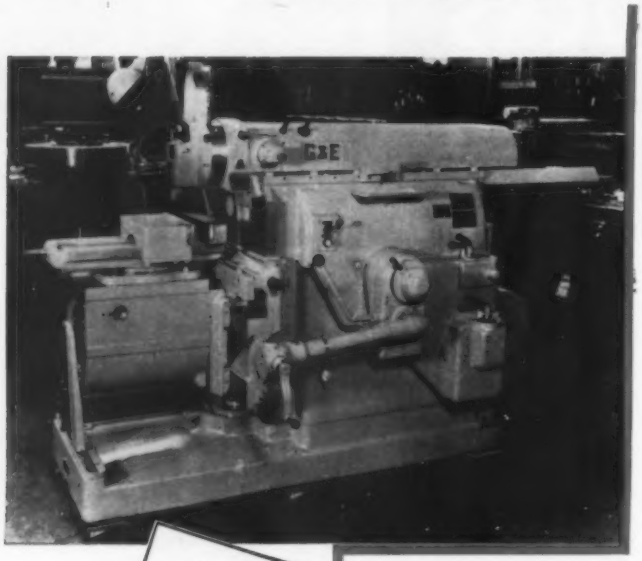
CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

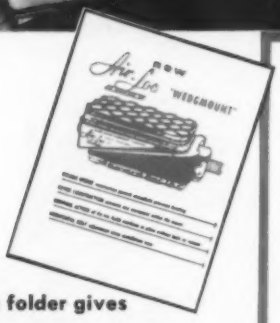
DODGE
of Mishawaka, Ind.

For more facts circle 581 on Reply Card

Can You Hold Your Shaper Without Bolts?

YES- with new WEDGMOUNT which anchors Shapers, Presses, etc. *and* permits precision leveling!





Free folder gives complete facts about

WEDGMOUNT with—

"Air-Loc" patented vinyl, sisal and cork pads top and bottom grip machines to floors

•

double-wedge construction which permits immediate precision leveling

•

keyed construction which prevents movement *within* the mount

•

sizes available thru distributors, and prices

This Gould & Eberhardt 24" Industrial Universal Shaper, operating at 120 cuts per minute with a 4" stroke, is installed without bolts on a new type machinery mount called WEDGMOUNT. A dial indicator at the base of the shaper showed a total oscillation of only .022" during operation, and no "walking." The 7,800 lb. machine is installed on six WEDGMOUNTS, each type 3" x 6" S. Before operation, precision leveling is achieved by simple adjustment of a bolt within each mount. Top and bottom of each mount is surfaced with patented "Air-Loc" pads, which provide the high degree of friction required to hold the machine in place despite its strong lateral thrust.

Air-Loc® WEDGMOUNT

write to... **Clark-Cutler-McDermott Co.**

115 West Central Street • Franklin • Massachusetts

For more facts circle 582 on Reply Card

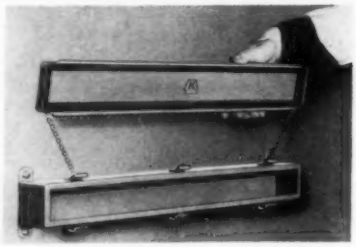
NEW PRODUCTS

(Begins on page 146)

each bearing, by simply removing the Alemite or Zerk fitting and screwing lubricator into place. Manufacturer says the lubricator will operate in any position and can be mounted in cramped positions with standard adapted fittings. The combination of bearing vacuum and spring pressure in the lubricator discharges only enough grease to replace amount used in bearing, company says, and eliminates over-or-under-lubrication. Anchor Chemical Co.

30—ENCLOSED TROUGHS protect electrical wiring

These troughs are suggested for installation of electrical wiring on machinery, in buildings and outdoors—wherever protection against oil, dust and water is required. Design features include removable clamping covers



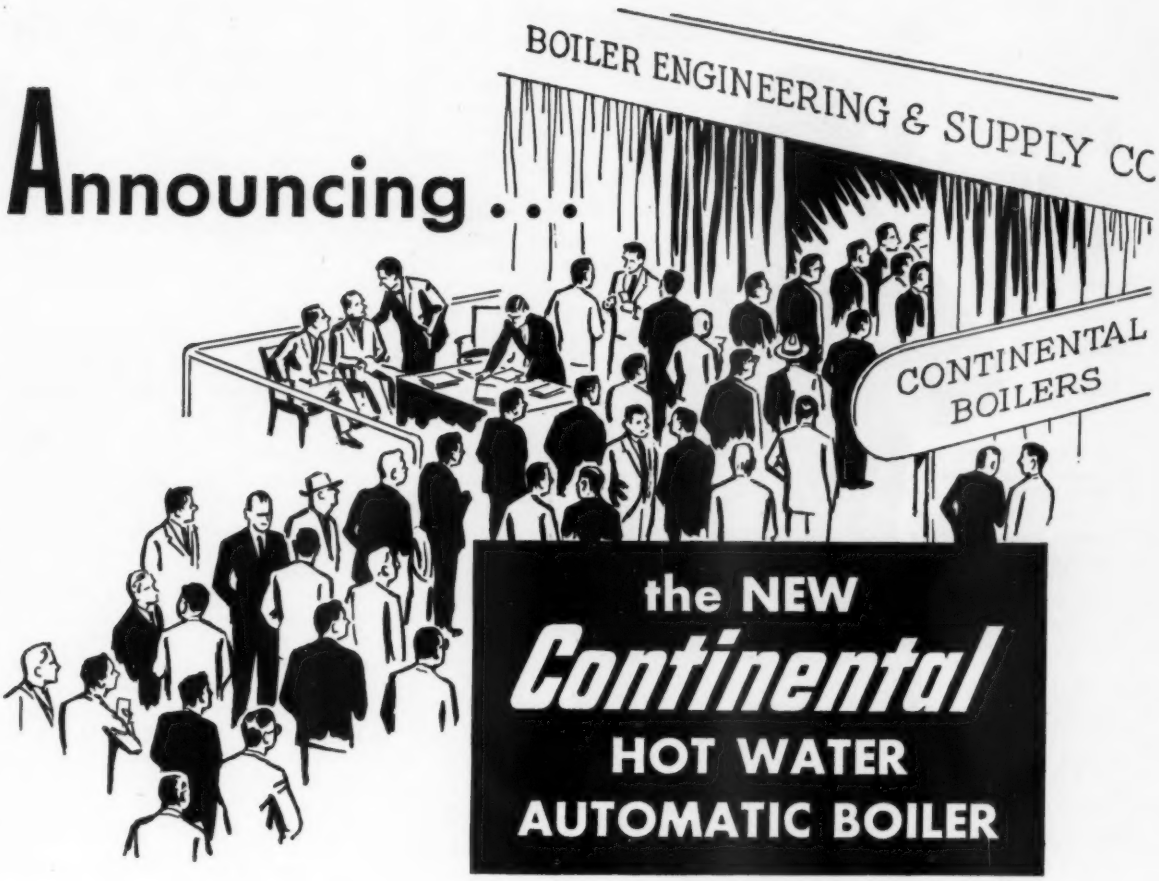
with Neoprene gaskets. Troughs and covers are assembled by semi-hinges on one side, screw-type clamps on the other. In addition, covers are chained to the troughs. There are no holes or knockouts, seams are welded, and external mounting feet are provided. The troughs are made to JIC specifications, of heavy code gage steel, available in four sizes from 2½-by-2½ in. to 8-by-8 in., lengths from 1 to 6 ft. Standard finish is gray enamel, but galvanized finishes can be had. Keystone Mfg. Co.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 221-222.

31—AIR VIBRATOR attaches without bolts

The Cleveland 3-in. VGV can be attached to almost any type of frame, box or table without bolts, company announces. This portable air vibrator has jaws that open to 2 in. and is attached simply by tightening its vise-

Announcing . . .



the NEW *Continental* HOT WATER AUTOMATIC BOILER

Shown for the first time at the ASHAE Show in Philadelphia

Here is a completely new approach to Hot Water Boiler design. Continental gives you all the features you want for efficiency . . . for economy . . . for low maintenance costs. Check these performance advantages:

- In the history of package boilers, there has never been a single case of damage due to "thermal shock" with the Continental Boiler.
- Operates at high or low water differential temperatures . . . at high or low rates of water circulation . . . responds rapidly to temperature controls.
- May be used for either direct or reverse flow.
- Has internal expansion space to cushion the dynamic surge of circulators and eliminate entrapped air from system water.

For complete engineering data on the new Continental Hot Water Automatic Boiler, see the Continental representative or write for Bulletin BE-200.

BOILER ENGINEERING & SUPPLY CO., INC.
Phoenixville, Pa.

For more facts circle 583 on Reply Card

MEET THE MAN

. . . who's dedicated to **your** job
. . . who knows your needs
. . . who knows your problems
. . . who knows wire and cable
. . . who is backed by engineering specialists
. . . who is backed by a reliable manufacturer

YOUR ROME CABLE SALESMAN

For more facts circle 584 on Reply Card

NEW PRODUCTS

(Begins on page 146)

like clamp. The vibrator also has an eye through which a hoist hook may be attached for ease in moving it around. Overall dimensions are 14¾-by-13-by-6 in., and weight, about 90 lb. The vibrator develops 3600 vpm at 60 psi, with air consumption 20 cfm. Cleveland Vibrator Co.

32—SOLID FILM LUBE works in oil, grease

Claimed to increase wear life of moving parts operating in oil and grease, this solid film lubricant, No. 4856, has two distinguishing features. First, it contains small particles of lead, tin and graphite, known for ability as bearing materials. Second, its semi-porous nature absorbs oil and acts as a reservoir against metal-to-metal contact under high loads and especially during long shutdown periods, manufacturer points out, and it is also compatible with additives in modern oils and greases. Typical applications include spherical bearings, clutch assemblies, leather oil seals, spline assemblies, bearing cages, others. Technical Bulletin 2056 gives details. Electrofilm, Inc.

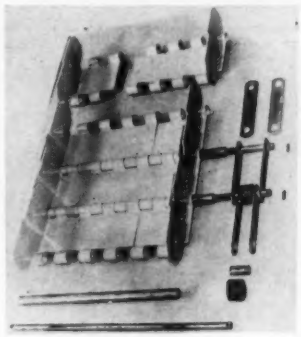
33—VAPOR TESTER is pocket size instrument

For on-the-spot checking of work areas for detection of hazardous vapors, the Bantam Vapotester can be operated in the palm of the hand or in its case. It is a self-contained combustible-gas analyzer, battery powered. Simplicity of operation is

featured. One knob turns the unit on and zeros the meter; a pilot light indicates "on" and also illuminates the 2½-in. scale dial. The sample hose and aspirator bulb snap into either side of the instrument for left or right hand use. A leather case holds the bulb, 5 ft sampling hose with short probe, spare battery, and screw driver. Manufacturer says the instrument is not affected by vapors of gasoline containing tetraethyl lead. Instrument and accessories weigh under 4 lb. Bulletin 1159 gives detail on this vapor tester. Davis Emergency Co., Inc.

34—CONVEYOR handles the scrap without clogging

This conveyor has multiple closely-fitted pan joints designed to leave no opening during movement for sharp-edged scrap to become wedged in, and side flanges serve to keep scrap



from spilling over in transit by forming a continuous deep moving "hinged pan." Mechanical wear during normal operation is restricted to two replaceable parts, it is pointed out—a roller and bushing on each hinge pan. They encounter friction as they follow a chain track, and if worn excessively can be replaced by means of a press-fit cotter pin. Each hinged-pan conveyor is a self-contained unit consisting of a head and tail shaft assembly mounted on structural steel framework and usually installed in a trench beneath floor level. Motor drive assembly is at the head shaft; return chain wheels and take-up terminals for adjustment are at the tail shaft. Gifford-Wood Co.

35—IMPROVED FILTER is compact, efficient

Type B Rollotron is a new design of this company's basic Rolotron agglomerator-filter principle. It is reported to combine efficiency of an electronic precipitator with low maintenance of an automatic, renewable media filter. In the Rollatron, dry, electrostatically charged plates are used to agglomerate atmospheric contaminates . . . dirt, smoke etc. Agglomerated particles are held together by intermolecular attraction until picked up by the air stream and deposited in the renewable media of the storage section. There, accumulated dirt is automatically wound into a compact roll for easy disposal. The

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who's dedicated to your job

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ROME CABLE

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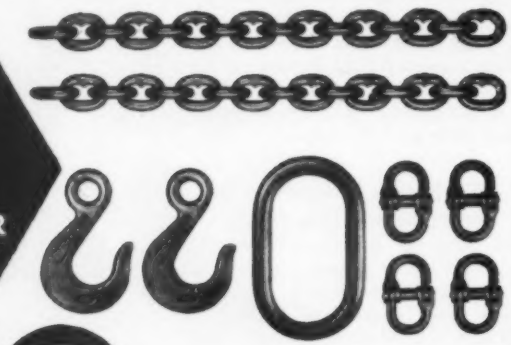

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NO MORE WAITING FOR SLING CHAINS

Gone are the days of waiting for new or rebuilt sling chains to reach you from the factory. Now, with all components furnished by your Herc-Alloy distributor, you can have your slings the same day. Leading alloy chain users are doing it. Write us or call your CM Chain Distributor for catalog, prices and assembly chart.

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With ***Hammerlok*** Coupling Links, anyone who can drive a nail can assemble or rebuild a sling chain in minutes. No peening! No welding! ***Hammerlok*** is rugged ...reusable...safe. Endorsed by leading alloy chain users.

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For more facts circle 585 on Reply Card

NEW PRODUCTS

(Begins on page 146)

Type B Rollotron is claimed unique in compactness, requiring minimum space in direction of air flow—easy to install and to maintain. It is noted that since it is not necessary to wash the plates water connections aren't used. American Air Filter Co., Inc.

36—WIRE BRUSHES for use in hazardous areas

For applications where sparks may be dangerous or undesirable, these phosphor bronze wire brushes come in 4- and 6-in. cup type, medium and wide face wheel type and both straight and bent handle hand-scratch type. Special types can be supplied. The Anderson Corp.

37—WALK-IN STRUCTURE for outdoor switchgear

Reported to afford ease of erection in the field, this outdoor walk-in construction for substation metal-clad switchgear is designed to provide generous space for withdrawing

breakers and testing and adjusting meters and relays with protection from weather conditions. It is available for single line-up or face-to-face installation with a common aisle for low-voltage, 4160-v or 13.8-kv switchgear assembly. Complete units can be pier-mounted or installed on concrete slabs. Hinged rear doors provide access to bus and cable compartments. Self-sustaining, the units have ventilating louvers and heaters, lights and convenience outlets. I-T-E Circuit Breaker Co.

38—FLOOR COMPOUND for patching, surfacing

H-F Epoxy-Crete consists of epoxy resin plastic, a hardening agent, and kiln-dried sand. It is explained that when blended, the mixture bonds permanently to old or new concrete, wood or metal floors to form a firm, smooth surface that provides tremendous resistance to heavy impact, abra-

"WE GOT THE BEARINGS WE NEED, —THANKS TO DISTRIBUTOR DAN THE SKF BEARING MAN

"That's fast delivery for you," the mechanic told the foreman. "Distributor Dan brought them over —from his own stocks. He's got hundreds of bearing sizes and variations in stock. So we're always sure of service when our purchasing department calls the SKF man *first*."

All Authorized SKF Distributors stock a large, diversified line of bearings—spherical, cylindrical, ball and tapered roller bearings—in countless sizes and variations. They offer you service, too, on bearings maintenance problems ranging from mounting to lubrication.

Why not find out exactly what the nearest Authorized SKF Distributor can do for you?

5915

Spherical, Cylindrical, Ball, and "Tyson" Tapered Roller Bearings

EVERY TYPE—EVERY USE

SKF®

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

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FOR ARMORED CABLE SUPPORT

CUTS COSTS

- A Complete Line of Rugged Aluminum or Galvanized Steel System Components Meet Every Layout Requirement
- Readily Connects to Existing Support Systems and Provides for Future Expansion
- Slotted Rung Design Simplifies Securing of Cables
- Cuts Cost on *Every* Installation —Large or Small

ASK FOR PROOF—

Before planning your next interlocked armor cable installation, contact your authorized electrical wholesaler and ask him how Cope Cable Ladder can help you cut costs. Or write to T. J. Cope, division of Rome Cable Corporation, Collegeville, Pa.

1010-PE

WIREWAY • CABLE LADDER & CHANNEL • SYSTEM SUPPORTS & ACCESSORIES

T. J. COPE

Division of ROME CABLE CORPORATION

For more facts circle 587 on Reply Card

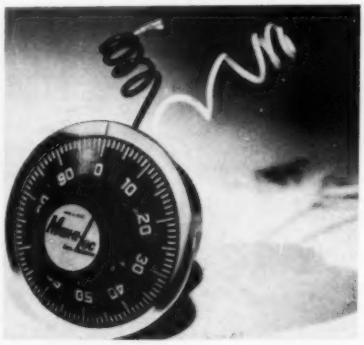
NEW PRODUCTS

(Begins on page 146)

sion and chemical acion. The compound is also suggested for walls and floors of food and drug processing plants, as it is not affected by scrubbing with strong soaps and detergents. The compound sets hard in 12 to 24 hr, it is stated, attaining a tensile srength higher than that of concrete. It is suitable for interior or exterior use. H-F Epoxy-Crete is packaged in correct proportions of the three components in 24- and 96-lb units, ready to mix. Howe & French Inc.

39—DIAL LOCK operates electrically, uses no keys

Max-A-Loc is claimed pick-proof, burglar-proof. No keys are used and there are no tumblers. It is designed to open only by rotating the dial knob



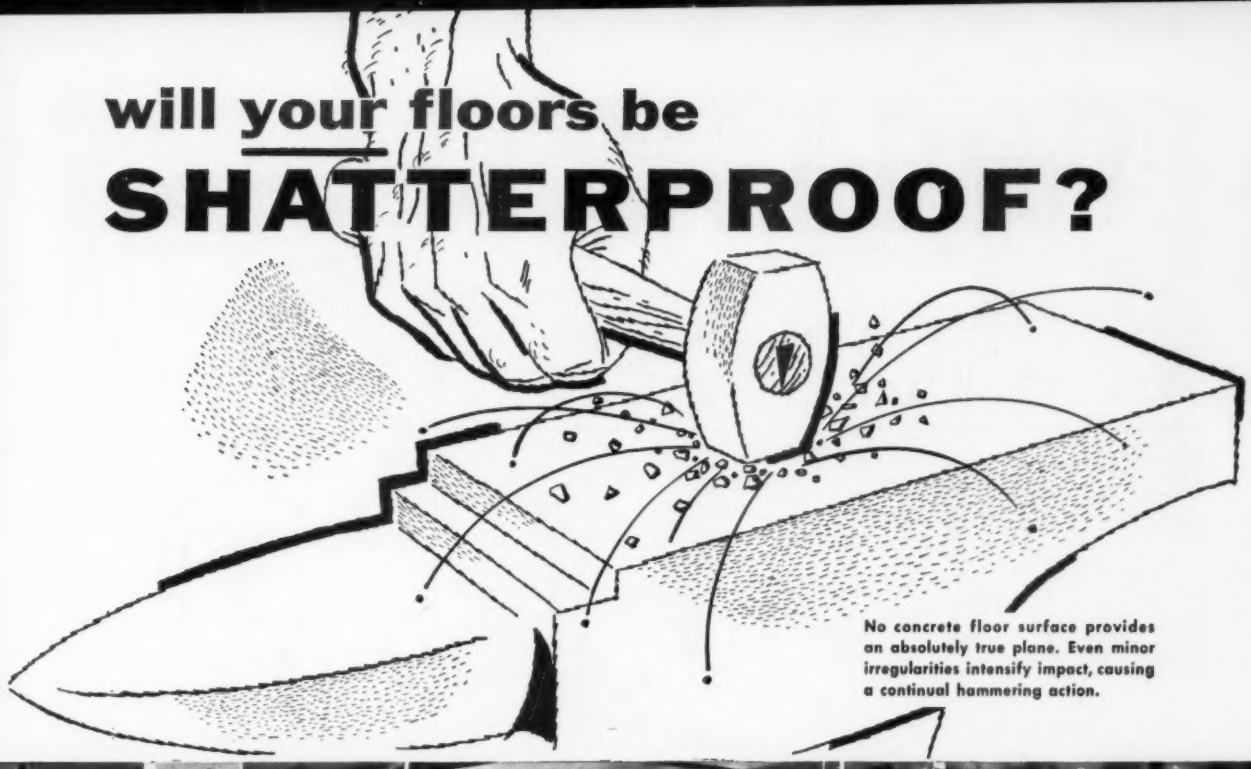
in the proper sequence. It can be installed single or in a series by connecting with present electrical system. This lock comes in ornamental chrome, black enamel or gold anodized finishes, costs around $15.00 for three-digit series. Radium-face dial is available as an optional extra. Max-A-Loc, Inc.

40—FLOORING resists corrosion in severe service

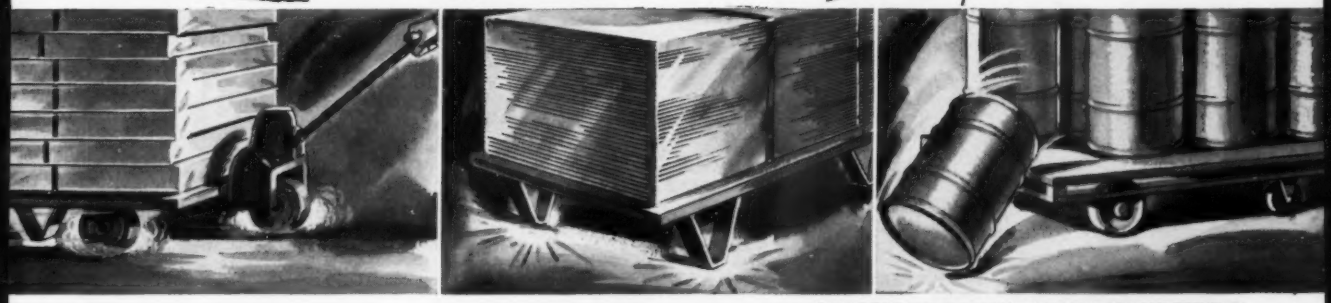
Stonclad is reported to withstand up to 50 per cen inorganic acid conditions without corroding. According to manufacturer, this material will withstand hot concentrated alkaline solutions to 170 F, nitric acid to 15 per cent, and concentrated sulphate solutions. Main feature of Stonclad, company stresses, is ability to resist corrosion damage from acids and alkalies and at the same time stand up under heavy traffic. Stonclad's toughness is attributed to its formulation of synthetic resins used together in such a way that a marcro-polymer or "chain strength" product is achieved.

Trowel applied, the product comes

will your floors be SHATTERPROOF?



No concrete floor surface provides an absolutely true plane. Even minor irregularities intensify impact, causing a continual hammering action.



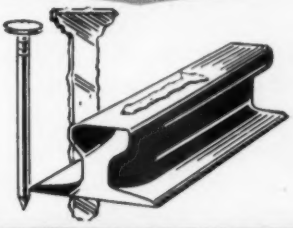
Hard aggregates do not necessarily make long-life floors. Many aggregates—even traprock, granite and emery—are unfortunately brittle. Impact from truck wheels, pallets and skids, and falling objects can shatter these brittle materials, produce ravelling, and start a chain of costly floor maintenance.

Masterplate metallic aggregate is tough yet ductile. The scientifically graded iron particles cushion impact, prevent ravelling and provide the highest abrasion resistance*.

Many million square feet of Masterplate floors are in use today and giving excellent service. Masterplate floors are virtually non-absorbent, oil proof and resistant to many corrosives found in industry.

Full information on Masterplate and "see-for-yourself" demonstration kit on request.

*In U. S. National Bureau of Standards Tests the Masterplate type floor had 6 times greater resistance to wear than the best plain concrete floor.



Basic principle of MASTERPLATE

You know what happens to a nail on the railroad track—it doesn't fracture or crumble; it merely flattens, retaining the same general shape. This is the basic principle of Masterplate. Because of its ductility, Masterplate, unlike brittle material, "gives" under impact, producing a floor with great wear resistance.

THE MASTER BUILDERS CO.
DIVISION OF AMERICAN-MARIETTA CO.

General Offices: Cleveland 3, Ohio • Toronto 9, Ontario • *Export:* New York 17, N. Y.
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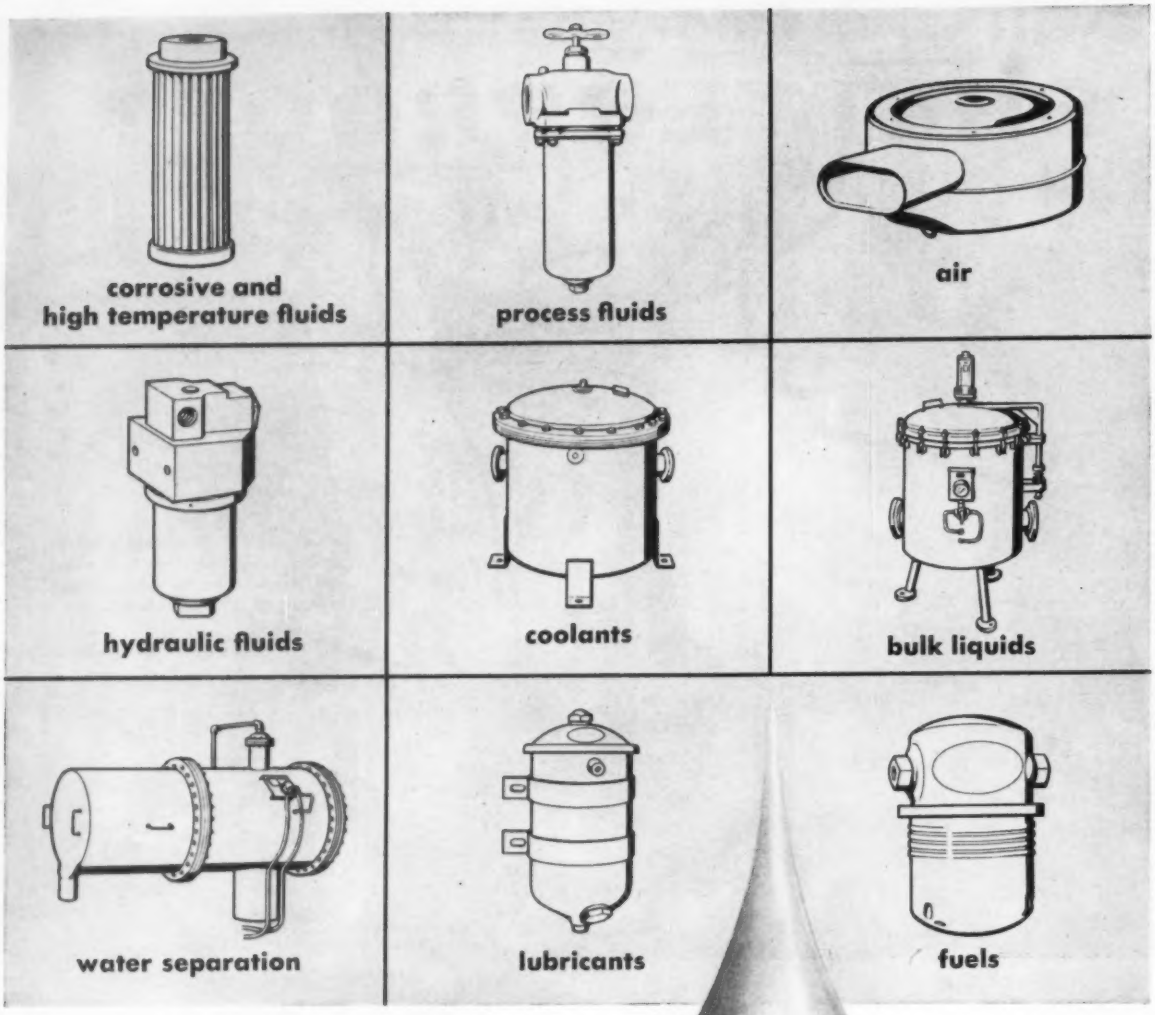

There are over 2,000 filter types available right now from Purolator. Before you consider special, custom made filters, let Purolator know your filtration problem. Write Purolator Products, Inc., 970 New Brunswick Ave., Rahway, N. J., Dept. PA2-415.

There's a Purolator filter for every known fluid

Filtration For Every Known Fluid

PUROLATOR

PRODUCTS, INC.

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For more facts circle 589 on Reply Card

NEW PRODUCTS

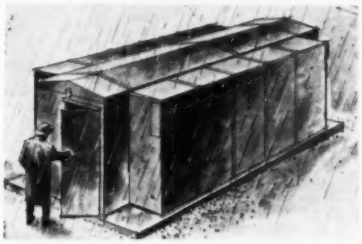
(Begins on page 146)

in three ready-mix parts to be combined at the job site; under normal conditions the mixture is workable for an hour or more, and an installation is ready for light traffic in 5 hr. Coverage for one unit at ⅛-in. thickness is given as 75 sq. ft. Stonclad comes in gray, red. Stonhard Co, Inc.

Reader Service Cards on pages 221-222 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.

41—WALK-IN ENCLOSURES protect men, equipment

Shelter-Clad Enclosures are designed to provide protection against the elements for operating personnel and 2000-to 5000-v motor control in outdoor installations. The enclosures con-



sists of two facing rows of company's Type H motor controls bridged by a metal roof. Backs of the control cabinets form the outside walls of the unit. A 5-ft wide aisle extends the length of the enclosure which has doors at each end. The basic unit can consist of any number of facing cabinets and any number of pairs of cabinets can be added or removed. Cabinets can also be had without instrumentation and arranged for office or storage use. They can be provided with lights and bus ducting can be from overhead, below or through the side. Allis-Chalmers Mfg. Co.

42—FHP DRIVE, all electric variable speed unit

An all-electric, variable speed drive from ⅛ through ¾ hp, the Fractional V*S Jr., has an 8:1 speed range. Larger speed ranges are obtainable for intermittent duty or light loads. These drives are designed for driving small

NOELTING Faultless Casters

L900

DOUBLE BALL BEARING SWIVEL MEDIUM DUTY

CUT YOUR HANDLING COSTS 3 WAYS

Faultless Casters

SUPERIOR DESIGN FEATURES

1 CORRUGATED TOP PLATE . . . fully hardened to give added strength. Slotted mounting hole spacing permits easy attachment.

2 MAIN LOAD BEARING . . . consists of 21 hardened, polished balls (⅜" dia.) rolling in large dia. hardened, lubricated raceway permanently attached to caster horn to assure perfect alignment.

3 LOWER THRUST BEARING . . . contains 10 hardened steel balls (⅝" dia.). Hardened raceway is machined from bar stock. Ball retainer is hardened formed steel.

4 EXTRA-LARGE DIAMETER KINGPIN . . . assures bonus strength in this caster.

5 CLOSE FITTING, FORMED STEEL CUP . . . protects thrust bearing from foreign matter. Holds lubricants in bearings, keeps floor clean.

6 HEAVY GAUGE, FORMED STEEL HORN . . . easily absorbs highest rated loads and thrust.

7 FULL SELECTION OF WHEELS . . . for all types of floors and operating conditions. Bolt and nut axles permit quick wheel replacement when needed.

SERIES L9700 RIGID PLATE CASTER Wheel types and sizes, load capacities and overall heights to match L900 Swivel Plate Caster.

ASK YOUR DISTRIBUTOR! Your Faultless Industrial Distributor will be glad to serve as your expert on casters and wheels. He stocks Faultless Casters and is prepared to offer "plus value" by recommending the right type, load capacity and wheels to suit your requirements. He is listed in your phone directory under "Casters."

FREE! SEND FOR ILLUSTRATED LITERATURE

Faultless Caster Corporation
Evansville 7, Indiana

Send me Free L900 Medium Duty Caster information.

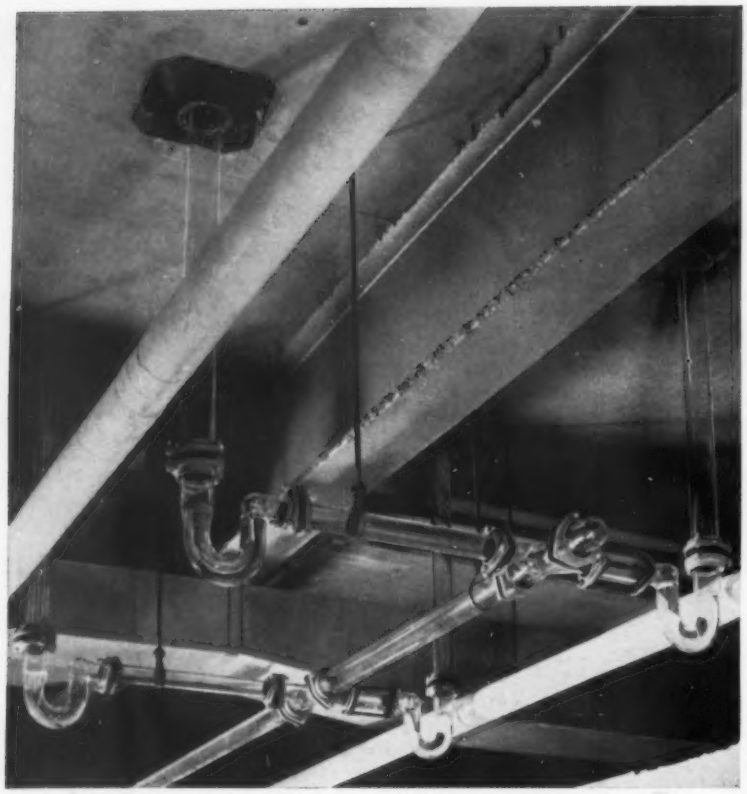
Name_____

Firm_____

Address_____

City_____ State_____

For more facts circle 590 on Reply Card



New Grand Island, N. Y. Research Center of Hooker Chemical Corporation uses 4384 feet of PYREX® pipe for corrosion-free drainlines throughout its 24 laboratories.

"Here's why every sink in our new 3.8 million-dollar lab has a glass drainline"

"There's no telling what acids we may handle in our new Research Center," reports Donald E. Springer, Chief Engineer at Hooker.

"So we tested the ability of several drainline materials to handle a wide variety of corrosives, including chlorinated compounds and others. We decided upon PYREX® pipe which easily met all of our requirements, including the ability to stand the shock of hot acids going down the drain, without a murmur of complaint.

"Our contractors on the job tell us that the PYREX drainlines went up quickly and easily. Only a few tools were required—and the light weight of the glass not only made handling easier, but also permitted the use of fewer supports than required by other piping."

NO—You don't have to build a new lab to get drainlines like these.

While PYREX pipe is a "natural" for modern new labs, it can also help you modernize your old laboratory. Glass pipe plumbs quite easily, and can be used in conjunction with your existing piping. Just a few feet of PYREX pipe may eliminate a costly trouble-spot in your waste system forever. A trial will convince you.

THERE'S MUCH MORE to the PYREX drainline story. For details on performance, maintenance, installation . . . write for Bulletin PE-30.

CORNING GLASS WORKS

10 Crystal Street, Corning, New York

CORNING MEANS RESEARCH IN GLASS

For more facts circle 591 on Reply Card

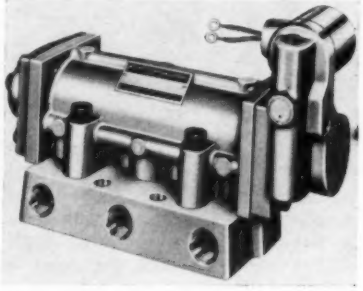
NEW PRODUCTS

(Begins on page 146)

conveyors, grinders, welding positioners, packaging machines, similar applications. It features a single half-wave thyratron electronic tube as the main rectifier, and operates on standard in-plant single-phase, 50 or 60 cycle, 220-v a-c power. Transformers are available for other voltages. Weighing only 30 lb and measuring 9½-by-14-by-8¼ in., the compact control unit can be mounted on the driven machine or at some remote location. It is designed to withstand normal vibrations encountered in direct machine attachment. The control panel is built around a printed circuit board. Variable speed motors are available in drip-proof; totally-enclosed, non-ventilated; totally enclosed, fan-cooled; or explosion-proof enclosures. Reliance Electric and Engineering Co.

43—CONTROL VALVES are rugged, compact units

These ½-in. poppet pilot B type single- and double-solenoid operated control valves are said to combine rugged construction, compact design and zero leakage. Manufacturer emphasizes that the valves have full ½-in. flow (275 cfm at 100 psi) and should not be confused with ⅜-in. valves tapped



½-in., but having only ⅜-in. flow; or ¾-in. valves tapped ½-in. Housings are aluminum castings. Valve chambers or compartments in the straight through bore are formed with metal spacers that position the packings and support them on both inside and outside diameters without placing them under mechanical pressure. Flow is through the hollow, radially ported stainless steel plunger and out the connected piping.

It is noted that pilot operation of the valves employs fluid pressure to operate the valve, permitting use of smaller, shorter stroke solenoids, fewer parts, less weight, and affording simplified electrical control circuits. Available in customary a-c and d-c voltages,

The SYLVANIA LIGHT INSURANCE Policy

(GUARANTEED BY SYLVANIA)

A new plan to protect your lighting investment: Sylvania fluorescents must give you more light at lower cost than any other brand... or cost you nothing!

Now, Sylvania fluorescent lamps *have got to outperform all other brands* on the basis of uniformity of performance, uniformity of appearance, maintained brightness, and life. They *must* give you more light, at lower cost, than any other brand!

Because if they don't, they cost you nothing.

Under a unique new policy, every large, regular user of Sylvania fluorescent lamps can have his lighting investment insured by Sylvania—at no cost to himself! If Sylvania's fluorescents do not live up to these claims, Sylvania refunds full purchase price.

How can we afford this kind of protection?

Answer: We know our product. We have studied it, worked with it for years to put it in a clear position of quality leadership. We can't lose.

And what better time to offer this new insurance than 1959—the year in which Sylvania engineers have swept *light-years* ahead of competition in fluorescent lamp efficiencies. For Sylvania fluorescents now give over 75 lumens per watt in the 75-watt, 8-foot lamp size . . . over 70 lumens per watt in the 40-watt, 4-foot size.

Ask your Sylvania representative or supplier to see a copy of the new Sylvania Light Insurance policy. And insist you get a policy with your next purchase. *If you prefer, write to us direct.*

SYLVANIA LIGHTING PRODUCTS
A Division of SYLVANIA ELECTRIC PRODUCTS INC.
Dept. 9L-7003, 60 Boston Street, Salem, Mass.
In Canada: Sylvania Electric (Canada) Ltd.
P. O. Box 1190, Station "O", Montreal 9

SYLVANIA... *fastest growing name in sight*

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Oxy-Catalyst Exhaust Purifiers for gas, LP-gas, diesel engines

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Profit from increased employee productivity . . . make air safe, clean and healthy. Install exhaust purifiers on materials handling equipment and other indoor engines to change dangerous exhaust fumes to harmless vapor!

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Only effective way to stop deadly exhaust fumes. Proven in over 1500 plants. Investigate—send today for your free copy of "Exhaust fumes are poison!" Mail coupon below.

CONTROL AIR POLLUTION! Oxycat Systems for industry clean up odors and combustible pollutants with catalytic oxidation . . . often at actual savings! Send for free brochure with full details.

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Please send me your free folder(s) on:
☐ Oxy-Catalyst Exhaust Purifiers to stop deadly engine fumes ☐ Oxycat Systems to stop air pollution

Name.....
Firm.....
Address.....
City.....Zone.....State.....

For more facts circle 593 on Reply Card

NEW PRODUCTS

(Begins on page 146)

these valves can be furnished in two- and three- and four-way actions, two- and three-position designs, with sub-plates either side or bottom tapped for ⅜- or ½-in. pipe connection. They are also furnished with sub-plates combination side and bottom tapped in ¾-in. size. Hunt Valve Co.

44—HYDRAULIC FLUIDS protect against fire hazard

Pyrogard Nos. 42, 43, 53 and 55 are synthetic, fire-resistant fluids for heavy-duty installations involving radial-piston pumps and high pressures. The fluids are made in four different viscosities and two types. According to company, they will satisfy requirements of high-pressure circuits and those installations having high fluid circulating temperatures. Socony Mobil Oil Co., Inc.,

45—STRIP CHART RECORDER is compact and simple

The Rustrak is announced as the smallest and simplest of strip chart recorders. Of rectilinear design, it contains a 63-ft chart roll, or 31 days'

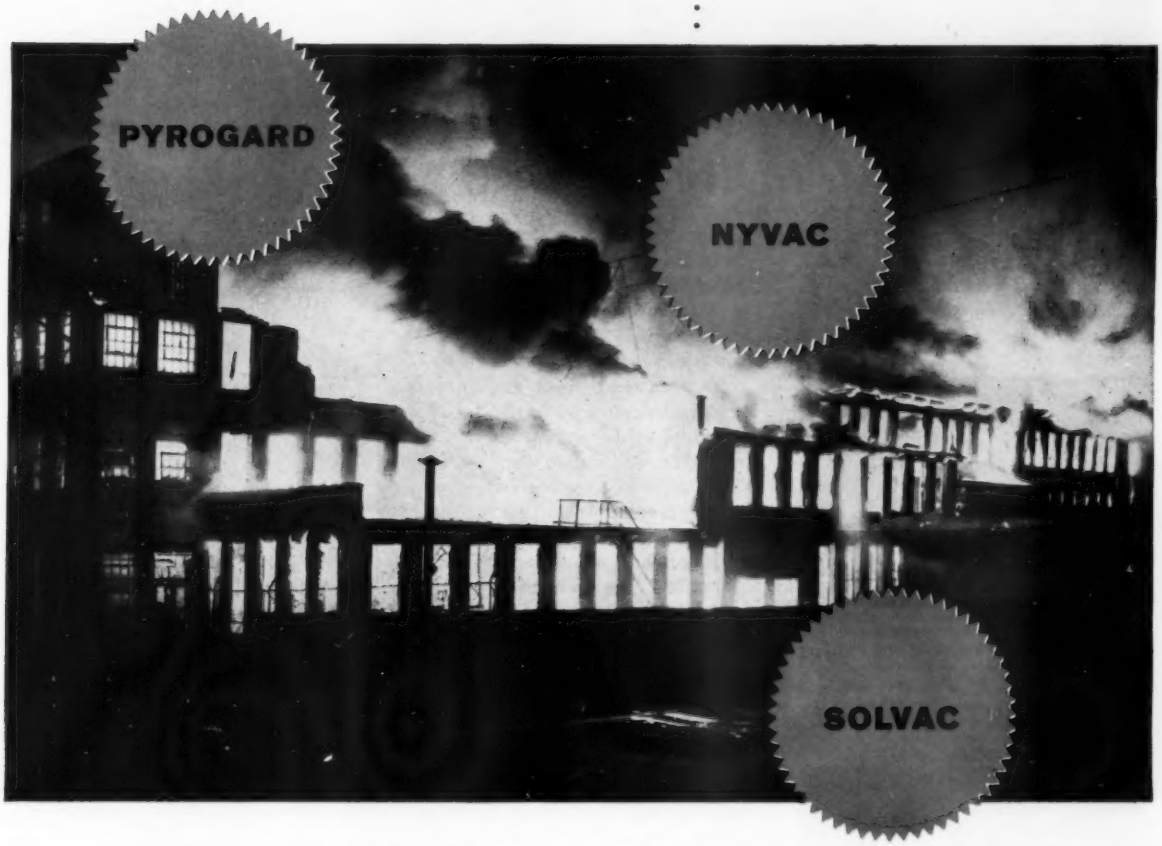
recording at 1 in. per hour. The marking process is dry, utilizing pressure-sensitive paper and requiring no ink, typewriter ribbon, electric current or heated stylus. The recorder is available for portable use or with brackets for panel mounting, singly or in groups. The basic 1 ma d-c unit costs around $70.00. Other standard d-c models and rectifier models are available at higher costs. Rust Industrial Co., Inc.

46—CLOSED TV adjusts to changing light

Built-in, automatic light adjustment control is standard equipment with the Model 1986 TV System. It is designed to adjust instantly to variations in light level of up to 1000 to 1. Manufacturer says it is suited for ap-

New Low-Cost Fire Protection

Protect your personnel, property, production— with a Mobil Fire-Resistant fluid that exactly meets your needs!



If any of your hydraulic systems operate near a source of ignition you're in need of a fire-resistant fluid. There are three types to choose from: Straight Synthetic, Water Base Synthetics and Emulsions of Water and Oil. With the introduction of Pyrogard, Nyvac and Solvac . . . now Mobil can supply you with *all three types.*

Each type Mobil fluid is designed for a definite field of service. Used within its field, each Mobil fluid will maintain production levels, protect your hydraulic systems against wear and deposits, assure precise machine operation.

A Mobil engineer will analyze your plant's needs and recommend the most economical type of fire-resistant fluid. He will also help you eliminate expensive system leakage . . . help prepare system for this type of fluid . . . even help train your maintenance crew.

Call your Mobil representative for full details on Mobil fire-resistant fluids. It's the lowest-cost fire insurance you can buy!

For detailed brochure on Mobil Fire-Resistant Hydraulic Fluids, write on company letterhead to Socony Mobil Oil Company, Inc., Room 2060D, 150 E. 42nd Street, New York 17, N.Y.

Mobil **CORRECT LUBRICATION**

Another reason you're Miles Ahead with Mobil

SOCONY MOBIL OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION, MOBIL OVERSEAS OIL COMPANY, INC.

For more facts circle 594 on Reply Card

5 MEN AND A CRANE; 45 TOTAL MAN-HOURS

That, in a nutshell, is the total of erection cost items for this Pittsburgh district industrial building covering an area 70 feet by 170 feet; 18 feet elevation at the eaves!

Truss halves are keyed together on the ground and raised in one unit for locking in place at the side columns. In center column construction, half-trusses are raised and locked in place at ridge and eave.

Erection of Swiss-Lok frames proceeds over and around other construction activity, as in the case of this construction of brick ovens.

And it's the same story everywhere Swiss-Lok tubular building frames are being erected. Riveting, cutting and welding, together with related equipment are all eliminated from the construction site. That's why Swiss-Lok rigid frames cost you less in place. Trusses, columns, purlins and girts are delivered at the site prefabricated and ready for fast, simple, slip-fit erection. The only tools needed on the job are hammers and a wrench for the foundation bolts.

As a bonus, you get strength *exceeding* A.I.S.C. requirements with ⅓ less weight, ⅓ less freight than conventional structural steel.

Swiss-Lok steel tubular framing can be used for any type of building layout and construction, whether commercial, industrial or institutional. Any desired wall and roof material is applicable. Swiss-Lok framing is rigid and does not rely on wall construction for support.

For construction to be done by in-plant personnel, factory supervision is available.

Write for literature fully describing the application of the Swiss-Lok principle to modern building construction and how it can reduce your construction costs.

SWISS FABRICATING, INC.
Office and Plant
Camp Horne Rd., Pittsburgh 2, Pa.
Phone WEllington 1-2646
Manufacturers of Swiss-Lok Scaffolding and Shoring

Swiss Fabricating, Inc.
Camp Horne Road,
Pittsburgh 2, Pa.

Please send me your descriptive bulletin on Swiss-Lok tubular building frames. PE

Name.....
Company.....
Address.....
City, zone, state.....

For more facts circle 595 on Reply Card

NEW PRODUCTS

(Begins on page 146)

plications where lighting conditions are subject to rapid change and the requirement is for optimum visual performance at all times. The camera used in conjunction with the camera control unit provides up to 1 v output at 10 ft.-c, with full 600-line resolution and zero degradation in the 10 shades of gray on the EIA test pattern. The monitor used has a 14-in. aluminized picture tube. Picture brightness, even under difficult ambient-light conditions is said to be assured by the use of a Polaroid filter and second anode voltage of 16,000 v. Geometric distortion at all brightness levels is claimed never more than 2 per cent. A white clipper circuit serves to automatically provide optimum definition when viewing extremely bright objects. Kin Tel Div., Cohu Electronics, Inc.

47—CONTROL VALVE has two-way action

This two-way valve is designed to allow independently controlled flow in either or both directions. Available in standard IPS from ⅛ to ¾ in.,

valve is claimed adaptable to hydraulic or pneumatic applications in pressures to 5000 psi. Valves are female threaded to dryseal specifications and available in brass, steel, aluminum, stainless, and special alloys. Dependability, lower friction loss, and greater flow at all temperatures are claimed. Units may be adjusted before, during or after installation. "Straight-through" ball-valve principle serves to permit sensitive adjustments and lessen clogging. True-Flo Valve Co., Inc.

48—MECHANICAL TIMER for automatic sprayers

For use on either rotary or vertical and horizontal automatical spraying machines the Mechanical Memory Timer is designed to substantially reduce overspray and material loss. This electro-mechanical control is designed to control individual spray guns so the spray pattern follows the

THIS IS THE IMAGE OF CF&I ...MAKER OF STEEL

He's a giant steelman. He makes good steel and steel products for the diversified needs of today's economy. He anticipates tomorrow's requirements. He is constantly improving products through research and new manufacturing techniques.

His steel mills extend across the country. In them, he guards every step of manufacturing by rigid quality controls. And in his national network of offices and warehouses, he not only *sells* steel products, but he *serves* their users in every possible way.

He is the dynamic image of CF&I . . . the symbol of dependable steel products. Look for him when you buy.

6583-A

THE COLORADO FUEL AND IRON CORPORATION

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CF&I STEEL

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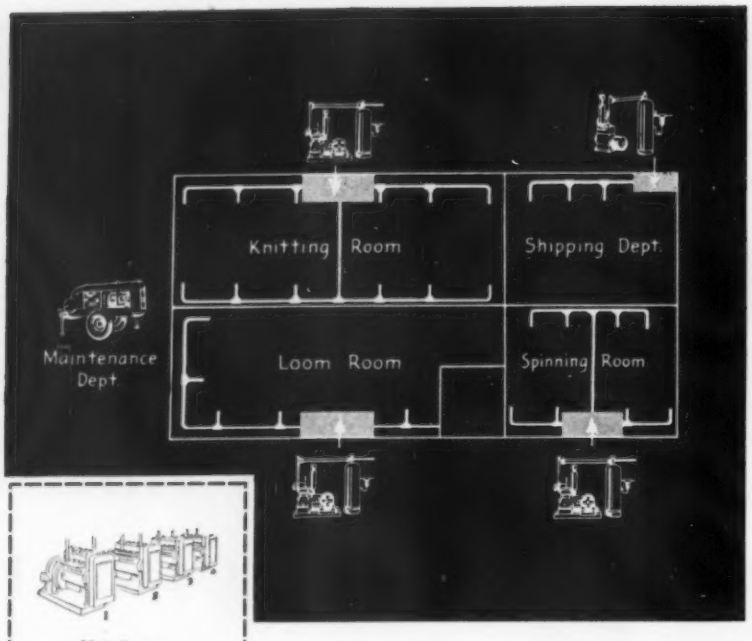
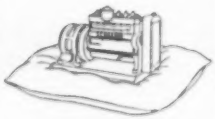
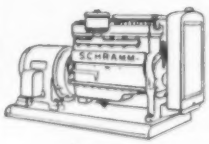


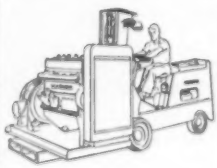
Unit System

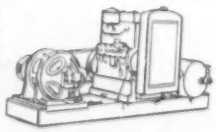

No Vibration



Compact

No Elaborate Foundations


Easy to Move


Complete Package

UNIT SYSTEM

Schramm Unit System offers big savings on compressor installation and operation

It costs far less to install several Schramm Air Compressors as a unit system than it does to install one large compressor. Long, costly pipe lines are eliminated. Compressors take up a minimum of space. You can put them where they're needed—right at the job. And you can increase air output simply by adding a unit as your needs grow.

No Vibration—balanced reciprocating parts provide smooth operation, lengthen compressor life.

Compact—takes less space—put your Schramm Compressor anywhere—take advantage of unused corners.

No Elaborate Foundations—eliminate this added cost with a vibration-free Schramm installation.

Easy to Move—change the location of your compressor whenever you need.

Complete Package—all you need for your air requirements in a single package.

For complete information, write for Catalogs GC-57 and 5510, or see your nearest Schramm Dealer.

See the Yellow Pages for local Sales, Service and Rental of Schramm Air Compressors.

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

665 North Garfield Avenue • West Chester, Pa.

For more facts circle 597 on Reply Card

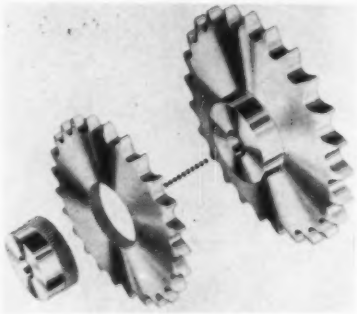
NEW PRODUCTS

(Begins on page 146)

outline of the product, and to actuate the guns only when there is a surface to be sprayed. Material savings up to 45 per cent are reported. The control can be adapted to existing reciprocating or rotary spray machines. As explained by manufacturer, the control components employ a "memory" system unaffected by surroundings. Described as a precision instrument yet practically indestructible, the Mechanical Memory Timer is encased in an individual housing to prevent entry of dust and dirt from surrounding processes. Binks Mfg. Co.

49—SPROCKET ASSEMBLY of interchangeable parts

Faster off-the-shelf service is reported available to roller chain sprocket users with Selecta-Bore Sprockets. According to manufacturer, this line provides over 600 possible pitch, teeth

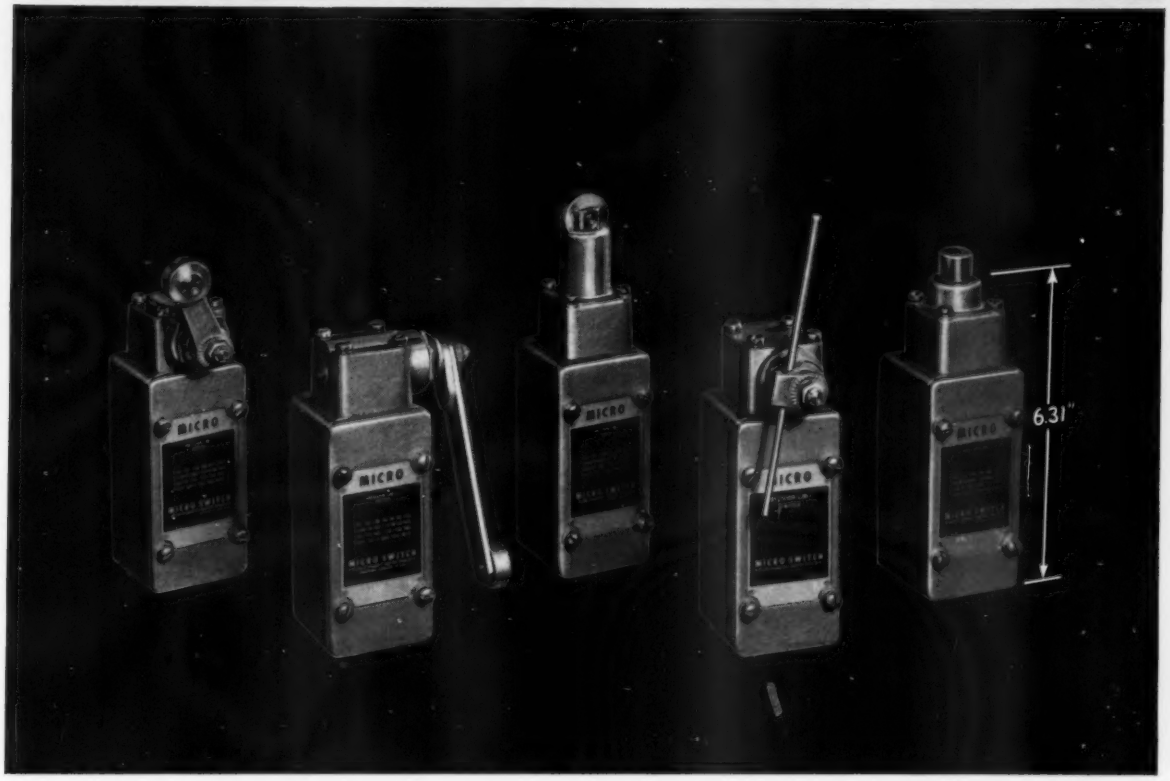


and bore size combinations, meeting finished bore sprocket requirements by means of interchangeable plates and hubs. Each assembled sprocket is ready for installation by user, complete with standard keyway and setscrew, it is noted, and no reworking is necessary. Whitney Chain Co.

50—VALVE POSITIONER has maximum sensitivity

Model J, a top mounted integral positioner, is claimed capable of matching or exceeding speed and sensitivity of modern pneumatic controllers. It is described as combining force-balance design with pilot-operated relay valve, providing high power output and maximum sensitivity. Model J is for use on both cylinder and diaphragm type actuators. It is capable of an infinite number of stroke lengths up to 8-in., in any combination of control forms through a variety of models, company says. Linearity is claimed better than 1 per cent, regardless of stroke length. Increasing or

MICRO SWITCH Precision Switches



Sealed "ML" switches with roller lever actuators, roller plunger actuator, low-force rod actuator, straight plunger actuator. Operating force ranges from 5 oz. for the rod actuator to 6 lbs. for the straight and roller plunger actuators.

"ML" Series sealed limit switches for heavy-duty industrial applications

Long-life precision switching elements in sturdy sealed aluminum housings characterize the "ML" switch family. "ML" switches have proved beyond doubt their ability to stand up under extreme mechanical punishment in the worst of environments . . . are widely used on machinery and other industrial equipment.

Sealed "ML" limit switches meet NEMA standards for non-ventilated enclosures of type IV-1C1.12 watertight and type VI-1C1-1.15 submersible.

Additional advantages of "ML" switches include:

- Adequate wiring space
- Switching elements have #8 screw terminals
- Additional actuators available
- Sealed covers secured with captive screws

Contact arrangements (and abbreviated electrical ratings to show range) include:

Two-circuit double-break—up to 600 vac.
Single-pole double-throw—up to 600 vac.
Double-pole double-throw—10 amps., 125 or 250 vac.

These switches are available through the Authorized Distributor near you. Help in switch selection is available from MICRO SWITCH branch offices. Consult the Yellow Pages. For complete description of "ML" and other heavy-duty switches, send for Catalog 84.

MICRO SWITCH . . . FREEPORT, ILLINOIS
A division of Honeywell

In Canada: Honeywell Controls Limited, Toronto 17, Ontario

Honeywell
MICRO SWITCH PRECISION SWITCHES

For more facts circle 598 on Reply Card

DAY

Pneumatic Conveying & Bulk Storage News

FROM *Feathers* TO STEEL CHIPS

no job is too delicate or too tough
for DAY Air-line Conveying Systems

DAY *air-line* pneumatic conveying systems can handle hundreds of different products, efficiently and economically. That's why you find DAY equipment in a bedding plant conveying feathers . . . and in a machine shop moving steel chips. These totally different DAY air-line systems demonstrate the versatility and ability of DAY equipment to best serve your pneumatic conveying needs.

Only DAY gives you all types of equipment and services

DAY not only provides high density (so called "fluidizing") systems and low density conveying systems but also can supply all types of accessory equipment including the finest bulk storage tanks. This undivided responsibility is your guarantee of efficient, proven, dependable equipment that's right for your plant!

Vertical Bulk Storage Tanks

Horizontal Bulk Storage Tanks

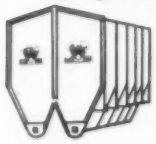
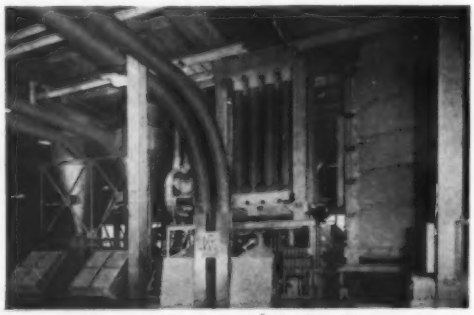


Photo (below) shows DAY **air-line** pneumatic system which combines product drying and cooling with conveying. This system has been in successful operation for over 6 years.



Because no one type of conveying system fits all jobs it will pay you to study DAY BULLETIN M-588. It tells how to improve plant efficiency 6 ways and make substantial savings 9 ways with modern DAY *air-line* conveying systems. Write toDAY for free copy — BULLETIN M-588.

The **DAY** *Company*

SOLD in UNITED STATES by
The DAY SALES Company
807 Third Avenue N.E.
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MADE and SOLD in CANADA by
The DAY Company of Canada Limited
Rexdale (Toronto), Ontario, Canada
Ft. William, Ontario, Canada

Representatives in Principal Cities

EQUIPMENT ONLY OR A COMPLETE SYSTEM

For more facts circle 599 on Reply Card

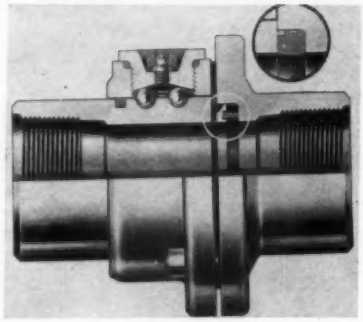
NEW PRODUCTS

(Begins on page 146)

decreasing outputs may be applied to either top or bottom of an actuator in a single mounting of positioner. Conoflow Corp.

51—SWIVEL JOINT designed for multiple service

Ball-bearing swivel joints in the DS series feature interchangeability of packing to provide for multiple services. These range from handling chemicals between -40 and 400 F at 300 psi internal pressure, to handling steam and hot gas, providing for steam



service rotation with a recommended maximum of 440 F at 360 psi. Maximum temperature rating is 600 F at 200 psi for occasional swing or oscillating services. Cold working pressure is 1000 psi. The design is such that packing seals may be replaced without removal of joint from the line.

When used with disc seals, the sealing chamber contains Inconel springs, which exert pressure on a pressure ring. These elements are removed and a molded packing inserted for services where packing is needed. Molded elastomer packings, including Viton A, are available. An Allen wrench is the only tool required to make the change. The joint comes in sizes from ⅜ through 4 in. in six basic swivel joint configurations. Bulletin DS1258 gives full data. Chiksan Co.

52—SAFETY SWITCH "polices" process air flow

The low-pressure Airflow Safety Switch can be employed to supervise air flow on the fan suction or discharge ducts of paint finishing and other processing systems. It is designed for flat mounting in remote locations or near the equipment involved. According to manufacturer, the unit is quick-acting—in the case of ovens, shutting off gas burners instantly—if anything interferes with

desired flow of air from the fans. It can also actuate alarms in plant areas where controlled ventilation is imperative. Although the standard unit is for pressures of ¼ -in. water gage, the switch can be built for any suction or pressure to 3-in. water gage. The standard switch can be mounted for normally open or normally closed action. The switch is rated at 5 amp, 115 v, or equivalent currents to 230 v. The R. C. Mahon Co.

53—FLOORING comes in ready-to-lay panels

Poly-Rock Floor Panels are ready for use over wood or concrete surfaces. These prefabricated panels are designed to eliminate on-the-job application skill. They can be installed almost while production continues, manufacturer says, and the old base requires practically no cleaning or preparation. The panels come in standard 4-by-8 ft. size and are ⅜ in. thick, feather edged to suit, if necessary. No adhesives are used—the panels are fastened with screw nails or with a new type drive plug when used over concrete. A feature announced for this floor system is extreme toughness under heavy, rolling loads. They are also claimed highly resistant to oil, water and acids. Company says the panels are nonslip. Plant Maintenance, Inc.

Use the Reader Service Cards provided on pages 221-222 to ask for more information on these products. Circle item numbers of products in which you are interested.

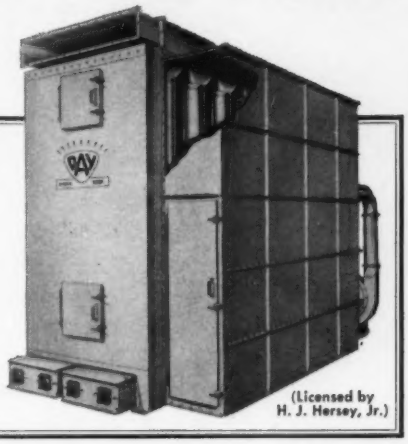
54—POWER PROTECTOR for service entrances

Type LB-1, a low-voltage power protector for heavy-duty service entrance protection and switching, is described as a fully coordinated device consisting of an interrupter switch and high interrupting capacity current limiting fuse. It is available as a two- or three-pole unit in 240- and 480-v ratings with interrupting capacity of 200,000 rms-amp, and can also be used as a heavy-duty feeder protective and switching device—particularly suited for heavy-duty building applications where power is supplied at 480 v or below from area or spot networks.

The LB-1 Power Protector is designed to provide maximum safety and reduced maintenance through use of a "quick-make, quick-break" operating mechanism that makes contact

DAY

DUST CONTROL NEWS



Largest selling filter of its type in the world!

DAY "AC" Reverse Jet Dust Filter

Cutaway view of DAY "AC"—available housed or unhoused—for pressure or suction.

(Licensed by H. J. Hersey, Jr.)

Better Dust Control Systems Cost Less When They Include a DAY "AC" Reverse Jet Filter!

Less equipment needed

Filtering rates for a DAY "AC" are 10 to 20 cubic feet of air per square foot of filter media. These are about five times greater than old style filters. This means you get maximum filtration from a minimum filter investment. Because virtually 100% of the DAY "AC" is operating at all times, no money is wasted on intermittent or standby units. One DAY "AC" will filter and keep separated, dusts from up to 10 different sources!

Less maintenance

You know all equipment requires *normal* inspection and care. But you'll find many DAY filters have been on the job for 5, 6, 7 or even 8 years that have had no repairs whatsoever. In short, *the Day "AC" is built* to last! They have an "appetite" for work and a reputation for dependability and long life.

Less space needed

Because of smaller diameter felt filter tubes the DAY "AC" gives you a greater air handling capacity in less space. DAY "AC" filters occupy up to 50% less space — an important consideration for plants of any size!

99.99+% filtering efficiency

The real "pay off" on DAY "AC" filters is their ability to clean dust laden air with near perfect efficiency! Even "tough" materials such as carbon black or atomic energy materials are filtered with optimum effectiveness.

For additional information about the DAY "AC" reverse jet dust filter write toDAY for Bulletin F-75. It also contains pages of useful air engineering data.

The **DAY** *Company*

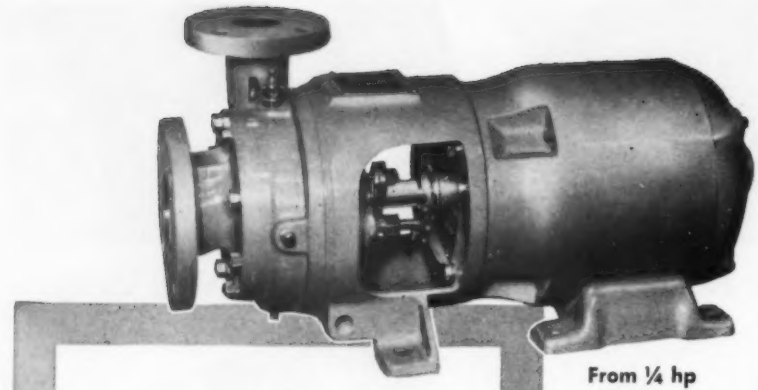
SOLD in UNITED STATES by
The DAY SALES Company
807 Third Avenue N.E.
Minneapolis 13, Minnesota

MADE and SOLD in CANADA by
The DAY Company of Canada Limited
Rexdale (Toronto), Ontario, Canada
Ft. William, Ontario, Canada

Representatives in Principal Cities

EQUIPMENT ONLY OR A COMPLETE SYSTEM

For more facts circle 600 on Reply Card



From ¼ hp
to 75 hp

ready now
to solve your
pumping problems

Ingersoll-Rand MOTOR PUMP

WHEN YOUR IMPORTANT PRODUCTION depends on proven pumping power, you need the efficiency and reliability of I-R Motorpumps! Low maintenance and minimum down-time mean cost-cutting operation that continues to pay off year after year.

I-R Motorpumps are always available in the widest range of types and sizes for every type of installation. Capacities from 5 to 2800 gallons per minute; heads to 650 feet.

Compact Motorpumps are easy to install. They operate in any position, save valuable floor space. Write today for specifications and performance data.

Ingersoll-Rand
9-827 11 Broadway, New York 4, N. Y.
For more facts circle 601 on Reply Card

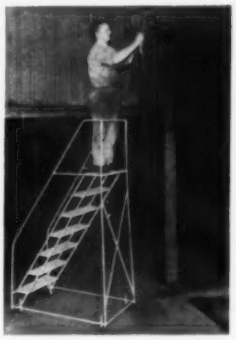
NEW PRODUCTS

(Begins on page 146)

speed independent of force exerted by the operator. Contacts and interrupter are designed to break up to 12 times the rated current. It is available for mounting in a free standing general purpose enclosure and for dead front switchboard mounting. General Electric Co.

55—SAFETY LADDERS feature smooth rolling casters

Trouble-Saver Safety Ladders combine safety and strength of steel construction with efficiency of a rolling unit, it is announced. They are made in 20- and 30-in. widths in sizes from



one to five steps without handrails, and from two to 12 steps with handrails. Design features include welded construction, smooth rolling casters which lock when user steps on ladder, flared base for greater stability, extra braces on taller ladders, expanded metal treads, curved front rails. Ladders are finished with a synthetic aluminum enamel. Bulletin SL-1 gives further information. The Patent Scaffolding Co., Inc.

56—V-S DRIVE for agitators, mixer duty

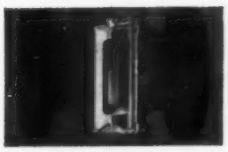
The Vertical Varidrive-Syncrogear combines in a single integrated unit a high speed a-c motor, mechanical type variable speed transmission and double reduction gearing. The unit offers advantages in applications where variations may exist in temperature, viscosity, batches or raw materials; or in pilot production to determine exact speed before a constant speed motor is installed. Simple in operation and maintenance, this unit contains no electronic or d-c components and connects to any three-phase a-c power source. Several methods of speed control are available: a handwheel on the unit, remote mechanical, remote electrical, or

Goodyear specifies Homestead Valves for non-contamination of GR-S latex rubber

Through the round ports of Homestead Lubricated Plug Valves at Goodyear Tire and Rubber Company's synthetic rubber plant in Houston, Texas, flow dilute solutions of GR-S latex rubber at 80 p.s.i. and 100° F.

Fluid solutions never lodge and build up in the line since Homestead Round Port Valves provide full circular opening through plug and body of the valve —same size as the pipe they serve.

A letter or the coupon below will bring you further information on this installation. You may also receive complete details on low first cost, low maintenance, Homestead Valves in our catalog 39-1.



Controlled pressurized lubrication plus extremely close tolerances between plug and body assure lubrication of all sealing surfaces without contamination of line fluids.

hv

HOMESTEAD VALVE MANUFACTURING COMPANY
P. O. Box 207, Coraopolis, Pennsylvania

For more facts circle 602 on Reply Card

☐ Please send me catalog and prices on Homestead Lubricated Plug Valves.
☐ Send more facts about latex applications.

Name ..... Title .....

Company .....

Address .....

City ..... Zone ..... State .....

builds bag - disposal bonus into dust - control system

There's a priceless extra ingredient built into every Wheelabrator Dustube® collector system. This bonus value stems from the unique ability of Wheelabrator engineers to view a dust control problem in its entirety, not as an isolated function.

Wheelabrator's "wide-angle" view of the dust problem at Rust-Oleum Corp. produced more than a system that merely did its job. It eliminated a related handling problem as well.

A severe dust problem resulted from pigment pouring operations. The Wheelabrator Dustube control system installed, traps and filters the pigment-laden air, recovering hundreds of pounds of valuable pigment every week. And, filling a need beyond dust control, it provides an automatic bag-disposal system. Empty bags are drawn through the duct system into a collection hopper from which they are emptied periodically.

Wheelabrator engineers will take the same "wide angle" view of your air pollution problem. Write for Catalog 562-D, illustrating how **Industry Relies on Dustube Collectors** for bonus values.

Wheelabrator Corporation, 859 S. Byrkit St., Mishawaka, Indiana

DUST and FUME CONTROL

For more facts circle 603 on Reply Card

NEW PRODUCTS

(Begins on page 146)

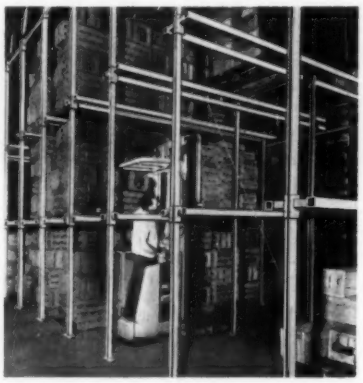
automatic control. A range from 3 to 30 hp with speed variations from 2:1 to 7:1 is offered, in 30 to 380 rpm. Bulletins 1957 and 1797 give data. U. S. Electrical Motors Inc.

57—CENTRIFUGAL FAN
is gas engine driven

Light in weight, and self contained the Type B Volume Fan features direct connection of fan wheel and four-cycle engine to provide permanent alignment and efficient operation. No batteries are required. The fan is suggested for ventilating applications where electricity is not available, as in manholes, vats and tanks. It has a carrying handle and can be moved around by one person. Two types are available, standard gasoline fueled units and propane fueled units at higher cost. Specifications are in Bulletin 257-20. Ilg Electric Ventilating Co.

58—ADJUSTABLE RACKS
have open-end feature

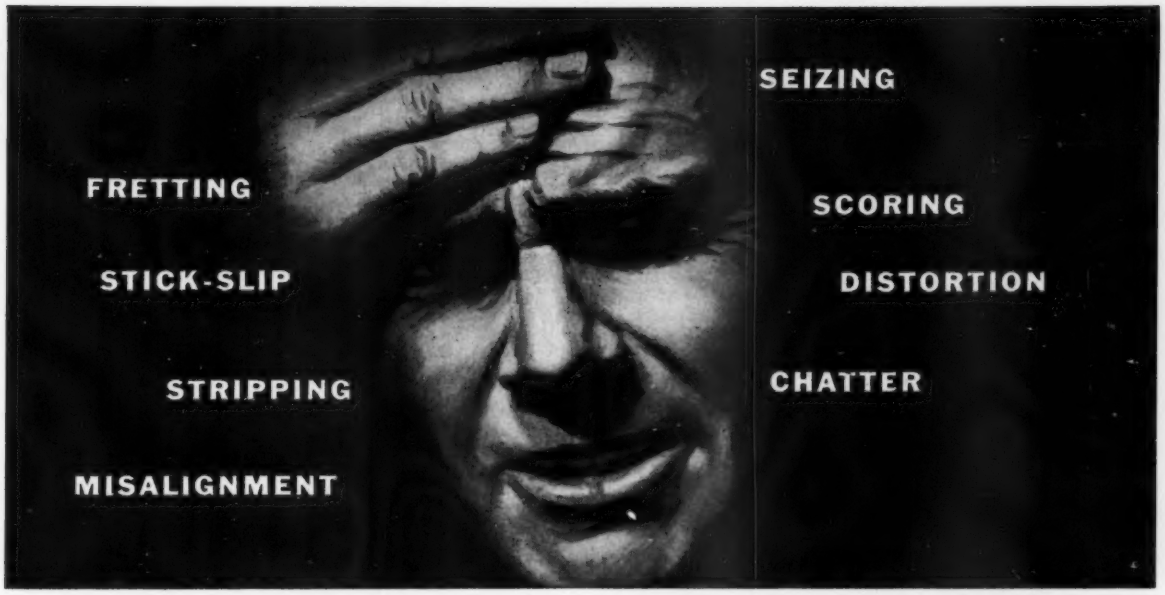
Drive-Thru Racks have both ends open for truck travel all the way through, making it possible to handle



loads on a first-in, first-out basis. Drive-In Racks are used against walls, or for truck entrance from either end. The racks are from two to ten or more pallets deep, and are designed to handle loads of practically any size, company says. Height of openings can be adjusted. American Metal Products Co.

59—CONDUCTIVE COATING
based on epoxy resins

Low volume resistivity, exceptional toughness and excellent adhesion are claimed for Hysol 6251, a conductive coating based on epoxy resins. It is easy to handle, says manufacturer,



WHICH LUBE HEADACHE IS YOURS?

Molysulfide® T.M. Grease can cure it in minutes

How is it possible? . . . Simply wipe a thin coating of Molysulfide grease—or Molysulfide concentrate—on the surfaces to be lubricated. The Molysulfide quickly forms a high strength layered film that prevents metal to metal contact, and lubricates even under severe load conditions . . . where conventional lubricants are wiped off or forced entirely out of the critical area.

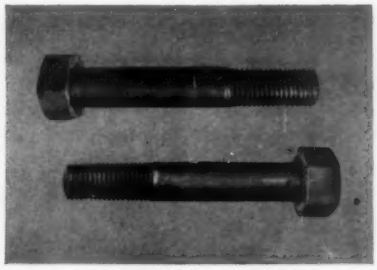
Four main properties of Molysulfide explain why it is so effective: (1) It is as slippery as ice. (2) Resists excessive pressures. (3) Lubricates over a wide temperature range —275°F to 850°F. (4) Sticks "like glue" to metal.

No other known substance equals Molysulfide heavy-duty lubricant as an immediate cure for galling and seizing of threaded connections . . . scoring and distortion of press fits . . . stick-slip or chatter on machine ways . . . fretting on splines . . . or for similar troubles involving gears, cams, collets and chucks.

Which lube headache can it solve for you? You can discover in virtually a single application.

Order a pound of Molysulfide, in either powder or concentrated grease form, from any one of the manufacturers below.

No slip-stick action at low speeds on machine tools gibs and ways when they're greased occasionally with Molysulfide heavy-duty lubricant.



No seizing. Service dismantling of power-house generator reveals bolts in top condition 21 months after Molysulfide lubrication.

Press fitting without galling. Both assembly and disassembly of locomotive drive journal go smoothly when Molysulfide lubricant is used.

CLIMAX MOLYBDENUM

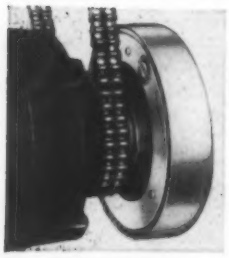
Heavy-duty lubricants containing Molysulfide are now available nationally. Order from any of these well-known manufacturers:

Acheson Colloids Co., Port Huron, Michigan • The Alpha Molykote Corp., 15 Harvard Ave., Stamford, Connecticut • Basco, Inc., 730 W. Jackson St., P.O. Box 461, Milwaukee 1, Wisconsin • Bel-Ray Co., Green Village Rd., Madison, New Jersey • Bemol, Inc., 131 State St., Boston 9, Massachusetts • Fiske Bros. Refining Co., 1500 Oakdale Ave., Toledo, Ohio • Jet Lube, Inc., 3093 N. California St., Burbank, California • McGee Chemical Co., 8000 West Chester Pike, Upper Darby, Pennsylvania

For more facts circle 604 on Reply Card

OFF-THE-SHELF

SERVICE WHEN YOU NEED IT...



Heard About Whitney-Tormag Magnetic Drives? *For complete motor overload protection, cushioned starts and high efficiency, ask about our new permanent magnet, self-contained power tranfer unit. Available in 1, 2, 3 & 5 H.P. units as stock items, additional sizes up to 15 H.P. will follow.*

Write for literature.
Box 306AF-TOR

Whitney, the *complete* line of finished steel chain, attachments and sprockets meets every industrial demand. Packaged for convenience, sure stock identification, easy, clean handling . . . exclusive plastic packaging of disassembled parts permits ready selection, quick, easy chain assembly.

Depend on your nearby Whitney distributor for all drive replacements and technical assistance. Your profitable production is Whitney's foremost project!

Whitney
CHAIN COMPANY

306AF HAMILTON ST., HARTFORD 2, CONN.

For more facts circle 605 on Reply Card

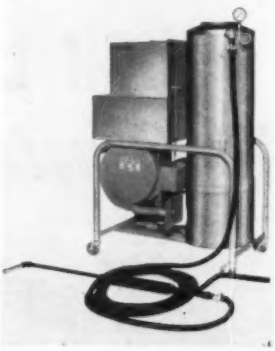
NEW PRODUCTS

(Begins on page 146)

and working time exceeds 4 hr. The compound is suggested for rebuilding areas worn away by sliding contacts, and as a conductive base for plating plastics when reliable bonds of the coating to the plastic are necessary. Full cure can be effected in 48 hr at room temperature, it is stated, or in 7 min at 300 F. Volume resistivity at 25 C is given as 0.0008 ohm-cm. Houghton Laboratories Inc.

60—STEAM CLEANER for the small operations

The Handy Dandy Steam Cleaner is designed specifically for use where cleaning operations seem too limited for economical steam cleaning, and for larger operations requiring an



easily-moved auxiliary or standby cleaner. The Handy Dandy delivers 80 gph of solution at 60-100 lb cleaning pressure. According to company, orifice-in-nozzle design provides hard-hitting, straight-ahead cleaning steam, with minimum fogging, and air atomizing burner promotes complete combustion of fuel, eliminating smoke, and fumes. Operator regulates cleaning steam simply by setting burner control to pressure desired. Two models are available; oil-fired with caster mounting, or gas-fired for stationary use. Malsbary Mfg. Co.

61—SLIDING SEAL VALVES threaded exhausts

This sliding-seal control valve has ¼-in. NPT ports and comes in two-, three- and four-way types with levers for hand or mechanical actuation. It is reported suited for operating single or double acting cylinders with a 3-in. diam bore. The series of valves has a flow capacity of 55 cfm to accommodate larger cylinders, and features a piped exhaust port. It is pointed out that piping exhaust air to a neutral

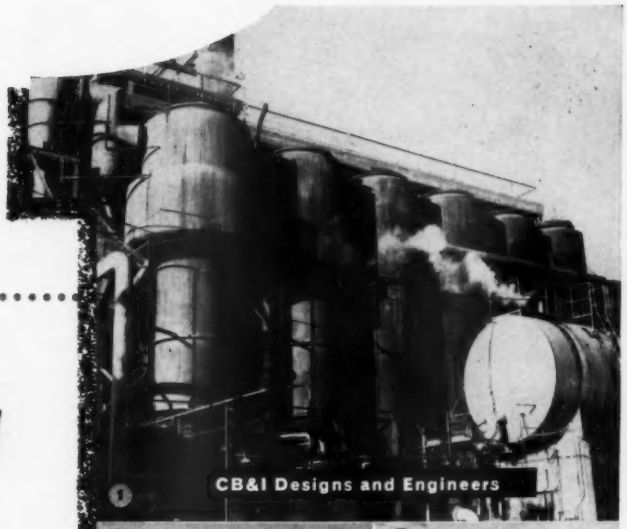
Single Responsibility

Guarantees efficient, time saving performance for steel plate structures

CB&I offers operators the advantage of a single *industry-experienced* source for construction of steel process equipment and storage vessels — from design, through fabrication and erection.

These highly coordinated services include the most extensive metallurgical inspection and control facilities available anywhere . . . equipment and techniques for stress relieving and X-ray in the shop or field — as well as the most modern automatic welding practices.

On your next job, the single responsibility services of CB&I will assure you of structures that *work* for you rather than merely *serve*. It's the reason why many companies are *repeat* customers for CB&I-built vessels.



CB&I Designs and Engineers

CB&I Fabricates

CB&I Erects

1 Stainless steel Hortonclad® sextuple effect evaporator for foaming black sulfate liquor.

2 13-ft. diameter by 63-ft. digester leaves CB&I stress relieving furnace.

3 CB&I-patented girth welder insures strong, uniform welds.

4 Seven 17-ft. diameter sulfite digesters and four 17-ft. accumulators were erected, welded, stress relieved and X-rayed by CB&I at this site.

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston • Kansas City (Mo.)
New Orleans • New York • Philadelphia • Pittsburgh • Salt Lake City
San Francisco • Seattle • South Pasadena • Tulsa
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, GREENVILLE, PA. and at NEW CASTLE, DELAWARE.
In Canada: HORTON STEEL WORKS LTD., TORONTO, ONTARIO

P82B

NEW sulfamic acid-based cleaners are supplied in light, disposable cartons. They're stored and handled dry ...no spillage or breakage worries.

OLD-style liquid acid cleaners—shipped in cumbersome, returnable carboys—require careful handling to prevent breakage.

✓Safer, easy to handle

Just one of the reasons why **Dry Acid Cleaners** based on **Du Pont Sulfamic Acid** are gaining wide favor for industrial equipment cleaning: ✓ Safer to handle ✓ Easy to use ✓ No hazardous fumes ✓ Powerful descaling action ✓ Less corrosive ✓ Lower handling and shipping costs.

CLEANERS BASED ON SULFAMIC ACID REMOVE SCALE AND DEPOSITS FROM:
Steam Boilers, Condensers, Heat Exchangers, Piping.

DU PONT **Sulfamic Acid**

BETTER THINGS FOR BETTER LIVING...*THROUGH CHEMISTRY*

Please send me:

☐ Free booklet about dry-acid cleaners based on Du Pont Sulfamic Acid

☐ Names of formulators who offer these cleaning compounds

E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Dept., Rm. N-2543PE
Wilmington 98, Delaware

Name_____

Firm_____ Title_____

Address_____

City_____ State_____

For more facts circle 607 on Reply Card

NEW PRODUCTS

(Begins on page 146)

point eliminates air blasts and noises. The two- and four-way valves are designed so that any port can be the inlet port. Adjacent ports are outlet or cylinder ports and the remaining port on a four-way valve becomes the exhaust port. This permits neat installations with necessity to criss-cross piping. Porting on three-way valves is predetermined. A neutral position detent is provided on the four-way hand operated type to let the operator stop the piston of a cylinder and hold it in position. A. Schrader's Son, Div., Scovill Mfg. Co.

62—POWER VENTILATOR is made of Fiberglas

Called Fiber-Aire, these units are of heavy Fiberglas. Claimed structurally equal to steel and with greater impact strength, the bonded housings are also

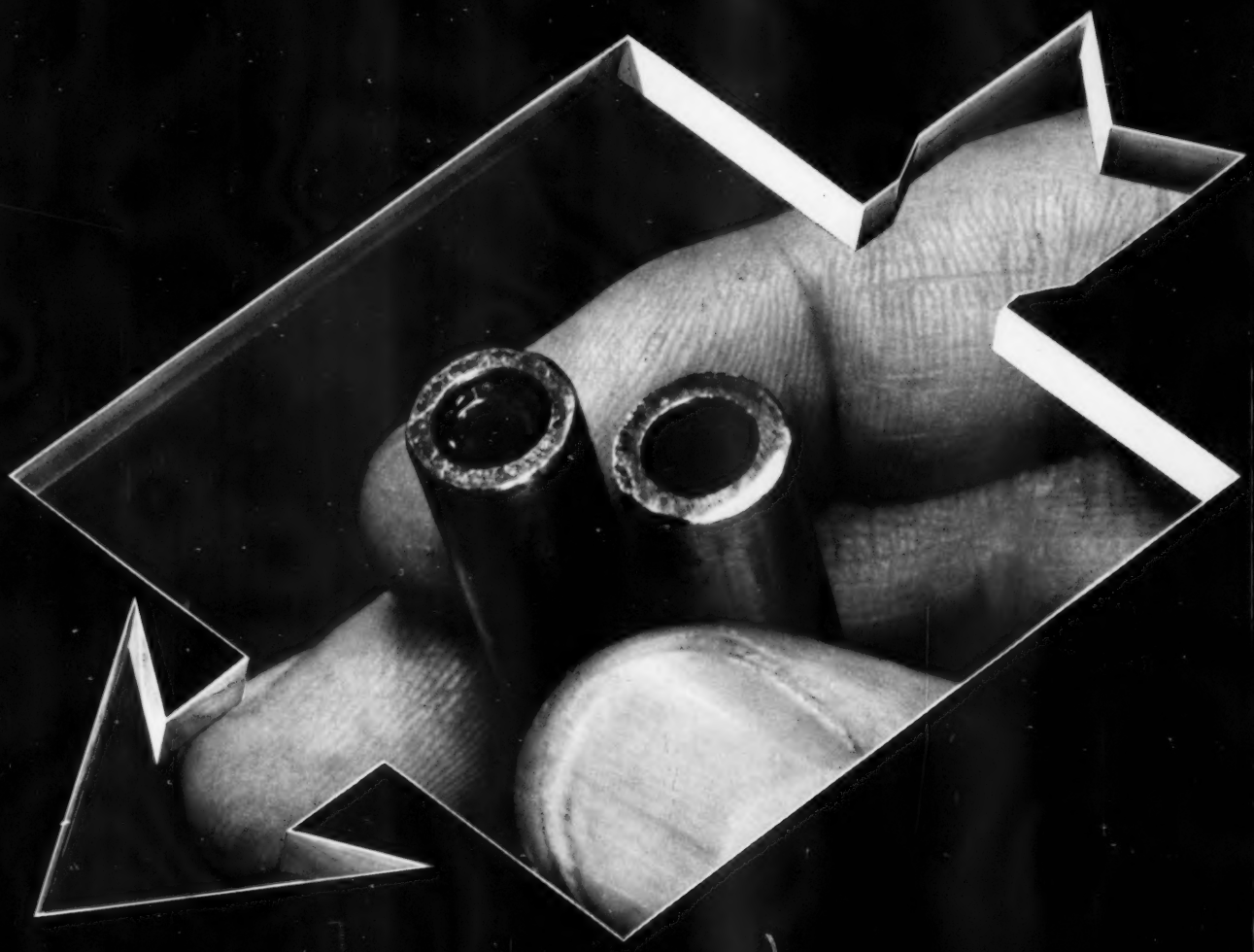
said to be immune to denting, cracking or breaking. Because Fiberglas is a non-resonant material, it eliminates the sound chamber effect created by many power units. Staggered air flow guides replace pipe struts usually used to support dome. Units are available in direct and belt drive models with capacities from 180 to 4,000 cfm. The Swartwout Co.

63—POWER CYLINDERS designed for water service

Model JW line of cylinders for 500-to-2500 psi water service is available in 1½- through 14-in. bores; Model HW line, for 3000-to-5000 psi service, in 1½- through 12-in. bores. Both lines have features designed to provide maximum resisance to rust and corrosion. Non-wearing parts are cadmium plated, piston rods are hard chrome plated stainless steel and piston cups and piston rod seals are of Hycar. Model HW has high tensile bronze pistons and hard chrome plated steel barrels. Model

For more facts circle 608 on Reply Card ⟶

Quality–the best economy of all



Two oils...two lines...one clogged...one cleaned

A Sunvis 700 oil and a regular oil were run through two equally clogged hydraulic lines. The regular oil couldn't remove the sludge. The Sunvis 700 oil cleaned its line thoroughly. That's one job it's made for . . . to clean out sludge deposits in hydraulic lines while it transmits power.

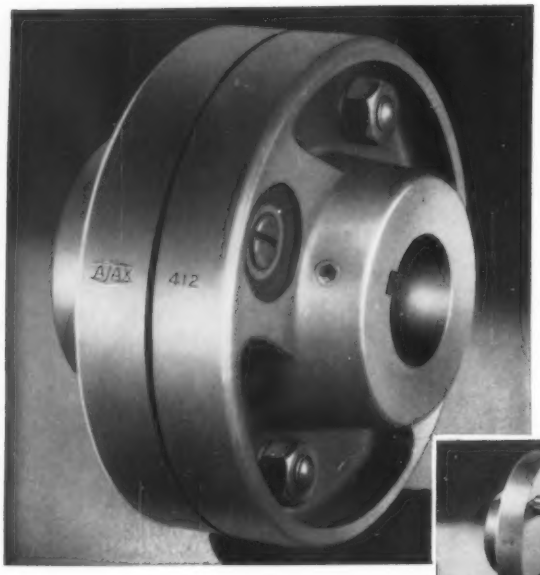
With a Sunvis 700 oil—like every Sunoco oil—you enjoy the best economy of all: the economy of quality. A Sunvis 700 oil lasts longer. The machinery it protects lasts longer. It prevents rust . . . ups output by reducing downtime.

FREE Trouble-Shooting Chart will help you spot and cure common hydraulic system troubles. For your copy, write to:

Sun Oil Company, Philadelphia 3, Pa., Department I-12.

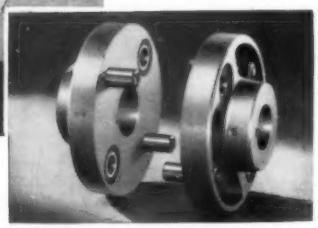
MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

SUNOCO®



Left: Periphery and face of Series 400 flanges are machined to simplify lining up with straight edge or feeler gauge.

Below: Separated halves show arrangement of 4 drive studs and rubber cushioned sleeve bearings.



AJAX ANNOUNCES

NEW *Series 400*

Normal Duty Flexible Couplings

at New Low Cost

● Original equipment manufacturers and plant engineers can now have the protection of AJAX positive resilient drive for direct-connected machines at minimum cost.

New AJAX Series 400 rubber cushioned flexible couplings are particularly suited to connect motors directly to pumps, fans, mixers, speed reducers, light duty hoists, compressors, and other machines with average torques in relation to shaft diameters.

The performance of new AJAX Series 400 Couplings is based on the same proven design which has been giving satisfaction in hundreds of thousands of installations for 40 years.

Their 4 steel studs and sleeve bearings require no lubrication. Rubber cushions absorb unavoidable misalignment, and their resiliency provides a quiet cushioned drive in both directions of rotation.

AJAX Series 400 Flexible Couplings are made in 4 sizes with 1¼", 1¾", 2¼", and 2¾" maximum bore respectively with standard square keys.

Mail coupon for Catalog 67.

AJAX

AJAX FLEXIBLE COUPLING CO. INC.
100 Portage Road, Westfield, N. Y.

Send Catalog 67 on Series 400 Couplings.

Name_____

Concern_____

Address_____

For more facts circle 609 on Reply Card

NEW PRODUCTS

(Begins on page 146)

JW has chrome plated pistons and hard brass barrels. Both come in cushioned and non-cushioned types. Miller Fluid Power Div., Flick Reedy Corp.

64—GROUT, non-shrinking, holds machinery tighter

Used in Emeri-Grout is a hard aggregate, Cortland emery, a form of corundum. According to company, Emeri-Grout actually expands slightly as it sets, and its firm grip is further assured by its plasticity before setting. Manufacturer says that, even in a low water-cement ratio, it is readily worked into restricted spaces without honeycombing or formation of water pockets. Since it is uncommonly ductile, Emeri-Grout absorbs vibration of heavy machinery without breaking down, it is claimed, and it is highly resistant to erosion by water or oil. Tests are reported to show that it will withstand up to 11,000 psi compression. Walter Maguire Co., Inc.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 221-222. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

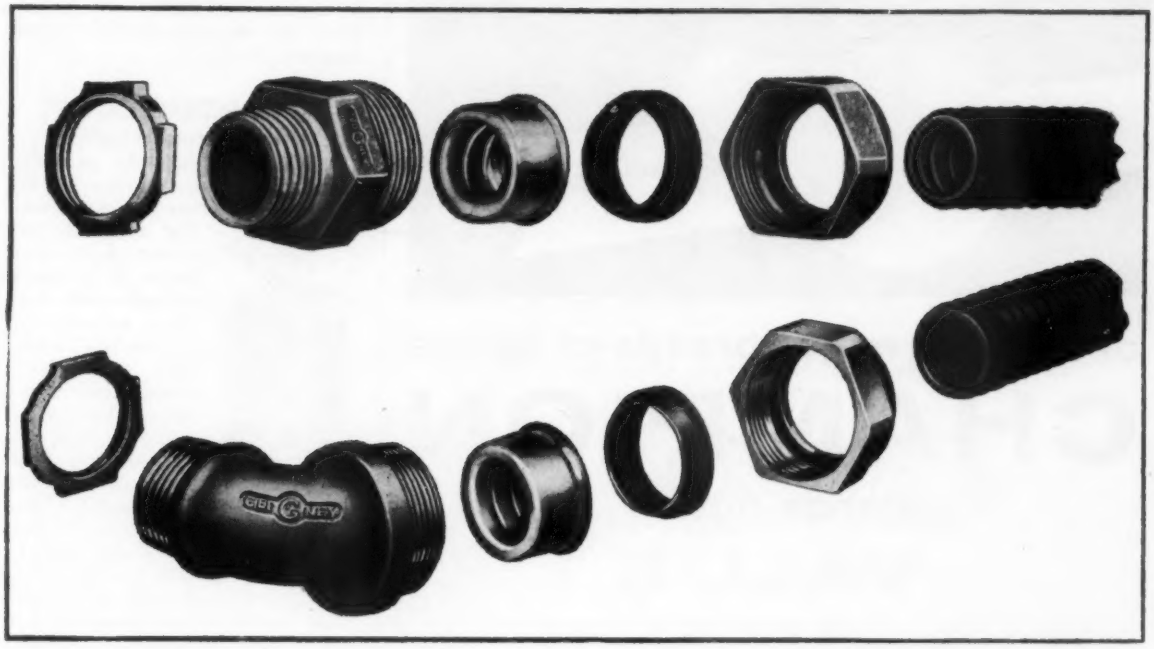
65—IRON SEPARATORS have improved magnets

Indox ceramic permanent magnets are featured in this line of tramp iron separators. The ceramic material is announced as barium ferrite, pressed into a compact under great pressure and permanently magnetized to produce an ideal flux pattern for effective tramp iron separation. When installed at head of belt conveyor system, the Indox-V magnetic pulley is said to outperform conventional permanent magnet pulleys and equal the deep-field power of electromagnetic types. Also, the radial design of magnet assembly boosts holding efficiency.

The indox grate magnet is installed in hopper or floor opening, chute or duct. Collecting tubes have continuous magnet poles, no "dead spots," it is stated, and the effective area is 400 per cent greater than in many types of grate magnets. The Indox-V magnetic drum, for industries where gran-

For absolutely Liquid-Tite Connectors specify

GEDNEY— every time!



THESE ARE THE NEWEST, most efficient liquid-tite connectors available today for use with Sealtite* and equivalent liquid-tite conduits. Designed to give wiring installations absolutely dependable protection in these popular oil- and water-tight flexible raceways, Gedney Liquid-Tite Connectors are built for lifetime service.

As shown from left to right in the exploded views above, Gedney Liquid-Tite Connectors consist of:

1. **Locknut—nut stock steel—cadmium-plated**
2. **Main Fitting—straight, 90° angle, or 45° angle—malleable iron—cadmium-plated**
3. **Grounding Bushing—one piece—threaded to engage conduit spiral**
4. **Molded Vinylite sealing ring—pliable—ever-lasting**
5. **Gland Nut—malleable iron—cadmium-plated**

Standard sizes range from ⅛" to 2" straight, 45° and 90° . . . order Gedney Liquid-Tite Connectors for top safety and longest life.

* *Sealtite is the trade name of American Metal Hose Branch of the American Brass Company*

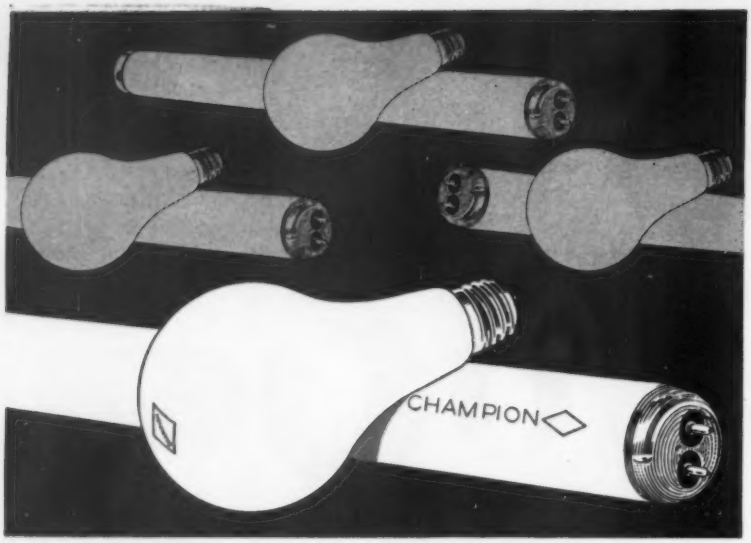
GEDNEY FITTINGS FIT!

GEDNEY
ELECTRIC COMPANY

GEDNEY

RKO BLDG., RADIO CITY, NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.

For more facts circle 610 on Reply Card



of the four major brands of lamps

CHAMPION

stands out for

VALUE

Champion balances

- LAMP EFFICIENCY
- LAMP COST
- LAMP LIFE
- LUMEN MAINTENANCE

to give you the most value in

- POWER COST
- LABOR COST
- LAMP COST

which means

- THE MOST LIGHT FOR YOUR MONEY

It's the overall cost of light that counts when you're judging value in lamps.

When you buy Champion Lamps, you're buying lowest overall lighting cost because Champion scientifically determines the balance of lamp characteristics that gives the most light for combined power cost, labor cost and lamp cost.

It's because of this balance that, of the four major brands of lamps, Champion stands out for value.

CHAMPION LAMP WORKS
Lynn, Massachusetts

CHAMPION Lamps
Incandescent Fluorescent
Your best buy in lamps

For more facts circle 611 on Reply Card

NEW PRODUCTS

(Begins on page 146)

ular materials are conveyed in enclosed chutes and spouts, is said to produce a uniform field 30 to 40 per cent stronger than most permanent magnet drums. Superior separating efficiency is also claimed for the Indox-V plate magnet in this line. Stearns Magnetic Products.

66—GROUNDING OUTLET with pressure terminals

The No. 5232, a three-wire grounding outlet with pressure terminals, is designed for a variety of applications.

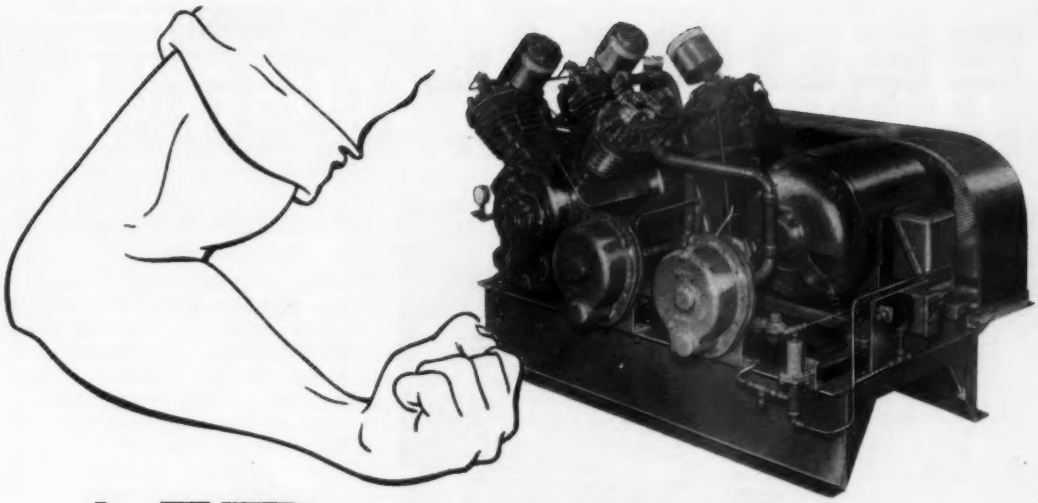
For use with No. 12 and 14 solid wire, outlet has bronze springs that hold wires securely and prevent loosening due to vibration. Bronze contacts are fully enclosed in individual pockets. Built-in slots position wires within outlet body. A wide release slot in outlet permits loop wiring to save time and simplify wiring. Unit also has a recessed gage to indicate length of wire to be stripped, and terminals identified for black and white wire. Pass & Seymour, Inc.

67—CLAMP speeds air hose, maintenance and repair

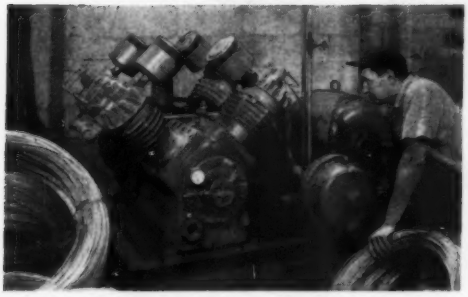
Circle Clamps can be fixed in place in 3 sec, it is announced, and the only equipment required to repair air hose connections or join lengths of extension hose are these clamps and a pair of pincers. These are one-piece, O-shaped clamps available in 20 sizes from ¼ in. ID to 2-⅝ in. ID; those less than 1-¾ in. have two lugs, the larger sizes have three. The clamps are said to hold up well in service, with holding strength well in excess of hose bursting pressures. Cuyahoga Products Corp.

68—COMPOUND keeps birds away from buildings

Bird-Free is claimed to stop pigeons and other birds from roosting on roof ledges, eaves and sills, without injury to birds. According to manufacturer, Bird-Free contains a substance birds do not like to stand on; it won't freeze in winter or run in summer, and is easily applied in strips with a putty knife or spatula. A 5-lb container costs under $23 and contains



AIR: ANOTHER ARM for INDUSTRY



Typical installation at Conver Steel and Wire Company, New York. Used to operate spot welders, benders, paint mixers and for clamping, holding, riveting, etc.

BRUNNER
SINCE 1906

AIR COMPRESSORS

To be of consistent value in industry, compressed air must be generated economically by equipment which assures low installation expense and keeps maintenance costs to a minimum.

The BRUNNER compressor meets every test . . . and, in addition, offers these advantages:

It's furnished in either single stage or two stage—to suit your needs.
It's compact! A complete, packaged unit with water-cooled intercoolers and aftercoolers mounted.
It's a space saver requiring minimum room.
It's versatile! Capacity is economically controlled to meet every variety of air demand.
It's rugged! Continuous oil filtering means less wear, longer life.

Single and two stage base mounted electric motor driven units, complete with controls of your choice. Single stage units offered in 80 or 100 P.S.I. ratings of 25-30-40 and 50 H.P. sizes. Two Stage units offered in 125 or 150 P.S.I. ratings of 25-30-40 and 50 H.P. sizes.

For complete details request Catalog 37.

Heat-X Air Compressor Aftercooler with inner-fin construction provides maximum heat transfer with minimum air pressure drop.
Available in WIA (water-cooled) or RIA (refrigerated) models for compressed air systems from 10 to 1500 CFM.

Request Catalog 8065.

BRUNNER DIVISION
DUNHAM-BUSH, INC.
UTICA, NEW YORK

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AIR CONDITIONING • REFRIGERATION • HEATING • HEAT TRANSFER
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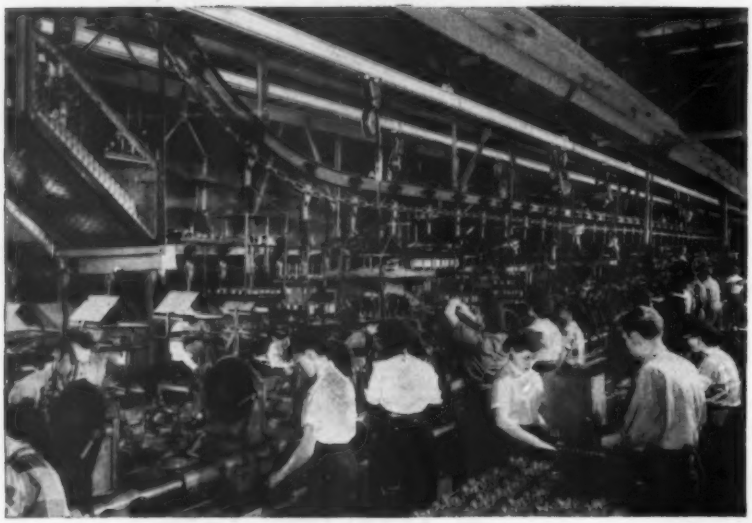
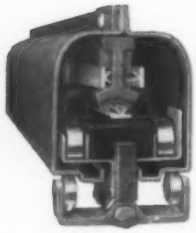
FEEDRAIL®

keeps production on the move



...because it moves with production



Feedrail systems (60 to 500 amperes) keep production moving throughout industry — provide convenient movable power sources for:

- Cranes and Hoists
- Production Lines
- Conveyor Assembly Lines
- Moving Test Lines
- Portable Tools
- Machine Tools
- Cutting and Sewing Rooms
- Lighting
- Motor Control
- Business Machines

Eliminate the dangerous, time-wasting "cable clutter" of old-fashioned production lines – and you've gone a long way to speeding up production.

Feedrail "moving power systems" do this by feeding power to portable tools and other electrical equipment through *overhead mobile outlets.*

Power is available instantly anywhere along the line. Long, dragging cables that hamper production are eliminated. Employees can move about in complete safety.

Result: *faster, safer production.*

An added plus is that Feedrail never becomes obsolete. If production requirements change, Feedrail can be relocated or extended with surprising ease and speed.

Find out what a difference Feedrail can make in your plant production. Get all the details. Write today to Dept. P-3.

SOLD BY MORE THAN 1,000 ELECTRICAL DISTRIBUTORS FROM COAST TO COAST

P72

ELECTRIC FEEDRAIL®

Never Becomes Obsolete

FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company, Inc.

125 BARCLAY STREET • NEW YORK 7, N.Y.

SPECIALLY QUALIFIED REPRESENTATIVES IN PRINCIPAL CITIES

For more facts circle 613 on Reply Card

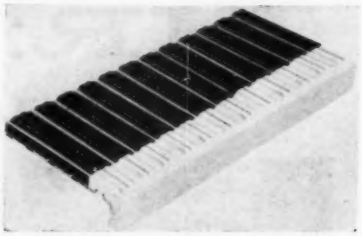
NEW PRODUCTS

(Begins on page 146)

enough to cover 250 linear feet in a strip 1 in. wide by ¼ in. deep. The Bird-Free Co.

69—SAFETY TREAD designed for rough usage

In use for many years on city bus lines, Rub-Bub Safety Step plate is now available to industrial plants. While designed to prevent slips through non-skid, anti-slip features, this plate is reported to have outlasted conventional patterned steel step plates in many installations. It features two-zone construction. Lip



and edge contain a high percentage of live rubber to help prevent shattered shinbone accidents and withstand heel gouging. The tread is made from a synthetic compound that resists heaviest abrasion, says manufacturer, and both compounds have toothy textures. Both are integrally molded and double bonded to punched metal backing. Rub-Bub Safety Step Plate is 5-16 in. thick. Standard tread depths are 9, 10 and 11 in. Widths range to 72 in. in all black, or to 36 in. with white safety edge. The tread can be screwed or bolted on new or old concrete or metal steps. In some installations, it can be cemented in place. Flooring Products Div., Samuel Moore & Co.

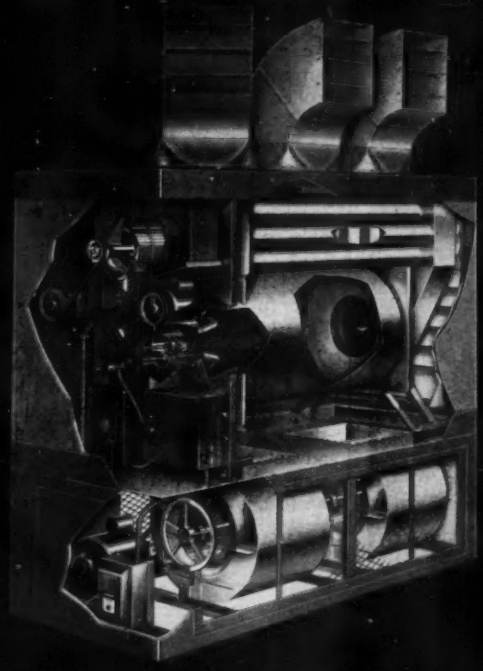
70—REDESIGNED DRIVE in ¾- to 7½-hp ratings

The Ajusto-Spede Drive is now available in ratings from ¾ to 7½ hp with a stationary field construction—no brushes, commutators and slip rings. The redesigned construction in these ratings also reduces the drive's length up to 22 per cent. Both a-c motor and eddy current clutch are built into a common housing. Drive shaft, height and diameter dimensions are the same as a standard motor of comparable rating. Motor end brackets are interchangeable with standard flanges and units can be flange-mounted to driven machine.

In the Ajusto-Spede, an a-c motor

LENNOX INDUSTRIAL HEATERS

Unsurpassed in efficiency



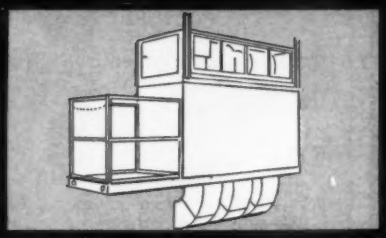
. . . low in operating costs year after year

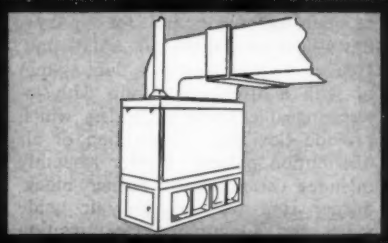
- COMPETITIVE ORIGINAL COST
- HORIZONTAL, VERTICAL OR SUSPENDED INSTALLATION
- GAS, OIL OR COMBINATION BURNERS
- FOR SPACE HEATING, VENTILATING, MAKE-UP AIR, DRYING AND OVEN APPLICATIONS

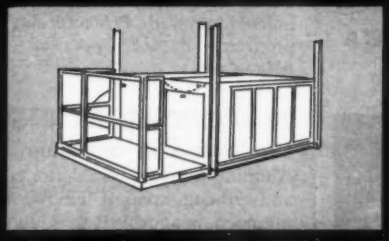
Lennox offers a complete line of industrial heaters designed for any type installation. Simple and effective design eliminates complicated parts . . . produces an efficiency rating of 80% or better!

In some units the "task-matched" blower section can be used for air conditioning, providing up to 25 tons of cooling. A wide choice of super quiet blower motors and drives satisfies all air volume requirements.

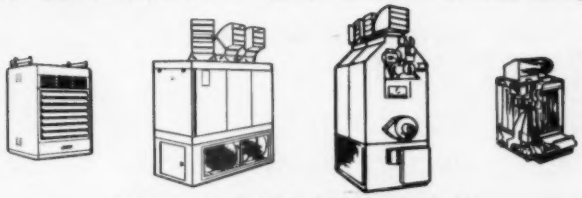
You're assured of the highest quality equipment in the heating, ventilating and air conditioning field when you specify "Lennox or approved equal."







LENNOX "Task-Matched" Equipment to condition and control air for industry



64,000 to 2,000,000 Btuh Units

Clip and mail this coupon for FREE SPEC SHEETS

LENNOX INDUSTRIES INC.
Industrial Division, Dept. PE-3
Box 1294, Des Moines 5, Iowa

Please send me—without obligation—complete specifications and engineering data on Lennox Industrial heaters.

Name_____

Company_____

Address_____ City_____

Title_____

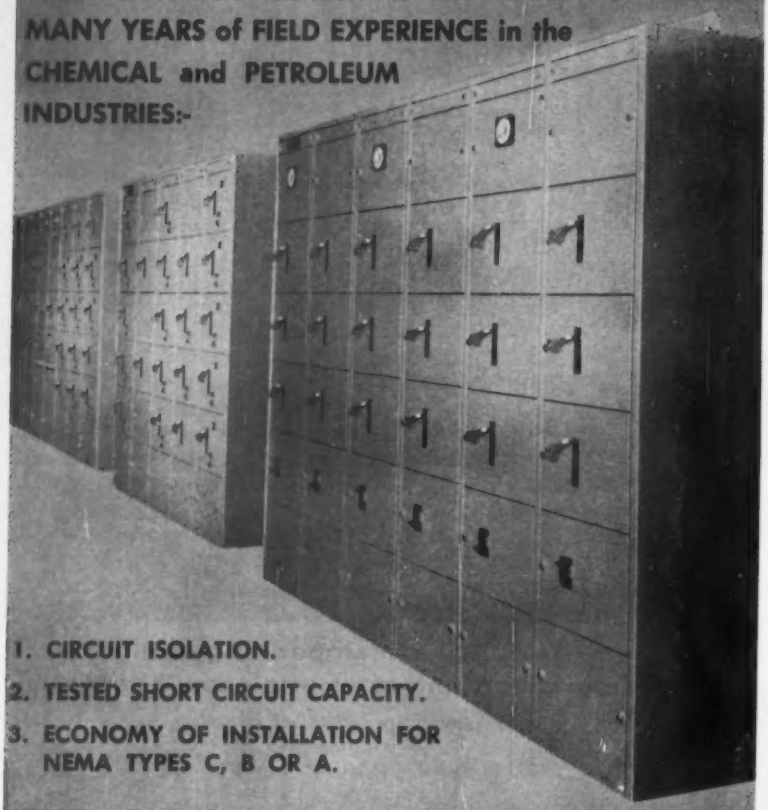
For more facts circle 614 on Reply Card

LENNOX Industries Inc.
INDUSTRIAL DIVISION
DES MOINES, IOWA

THERE'S A LENNOX REPRESENTATIVE NEAR YOU

HERE *is the* ENGINEER'S CONTROL CENTER

WITH POSITIVE FEATURES THAT WERE DEVELOPED and DESIGNED INTO THIS ALL-NEW MAXIMUM PROTECTION CONTROL CENTER as the RESULT of MANY YEARS of FIELD EXPERIENCE in the CHEMICAL and PETROLEUM INDUSTRIES:-



1. CIRCUIT ISOLATION.
2. TESTED SHORT CIRCUIT CAPACITY.
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MAXIMUM PROTECTION CAN ONLY BE ACHIEVED BY COMPLETE **CIRCUIT ISOLATION** PLUS TESTED SHORT CIRCUIT CAPACITY.

SEND TODAY for your copy of the new TECHNICAL DESIGN DATA BOOK of maximum protection control centers.

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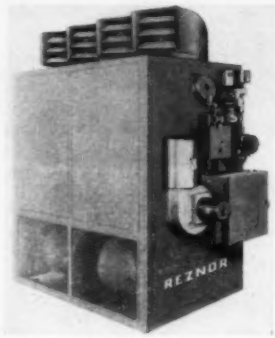
NEW PRODUCTS

(Begins on page 146)

drives a clutch drum at constant speed while speed on the clutch spider (output member) is adjusted by varying d-c excitation to clutch coil. Direct current is supplied by a small controller. Finger tip command of drive operations is concentrated in a separate operator's station. The drive is designed to supply precise operating speeds for machine tools, process machinery, conveyors etc. It is suitable for continuous operation at full load (constant torque) in ranges up to 34:1 and for intermittent use from 0 to full speed. The Louis Allis Co.

71—FORCED AID HEATERS offer design improvements

Advanced burner design and substantially lighter weight are among advantages claimed for this redesigned line of heavy-duty forced air heaters, the Series S, available in ten sizes from 400,000 to 2,000,000 Btu/



hr. All sizes are available for gas, oil or dual-fuel firing and for up-flow, down-flow or horizontal installation. Heaters may be used in a duct system or with a discharge plenun with interchangeable louvered outlets which provide flexibility in selection of air distribution pattern. Burner assembly includes ceramic-lined burner block, burner ring with integral air guide vanes and a simple electric ignition unit. Primary control unit is a Minneapolis-Honeywell Protectorelay which programs burner operation. Reznor Mfg. Co.

72—CONDUIT, FITTINGS produced in aluminum

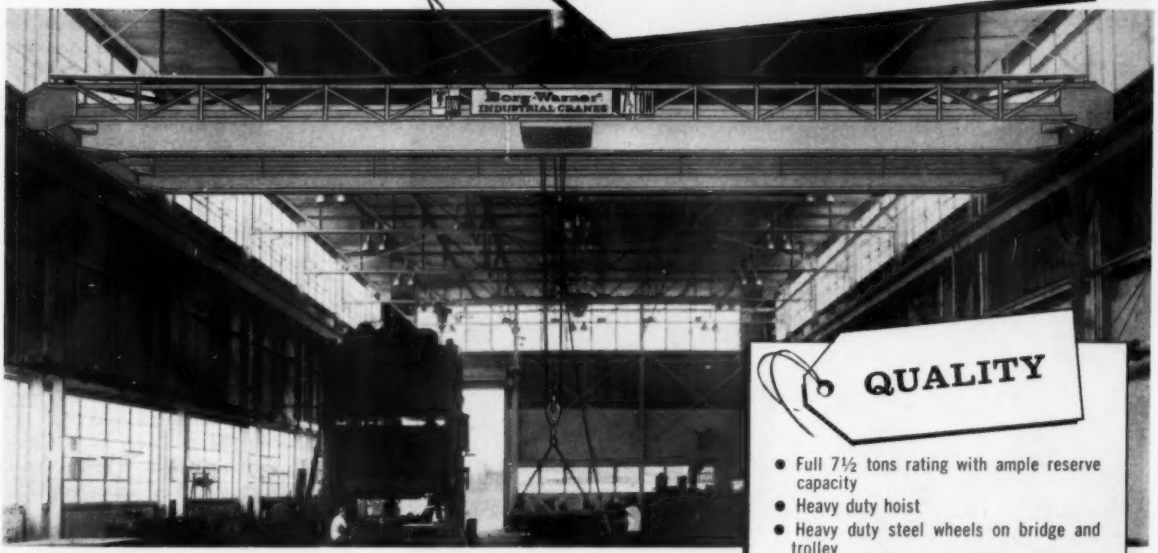
Aluminum rigid conduit, couplings and 90-deg conduit elbows are announced as approved by Underwriters Laboratories and meeting the same size, shape and tolerance requirements as those for steel conduit. Nominal diameter sizes for the con-

Borg-Warner Industrial Cranes

Quality at a price you can afford...

$9900.00

For a 7½-Ton, 60 Ft. Span,
3 Motor, Top-Running Double Girder
Industrial Service Crane



QUALITY

- Full 7½ tons rating with ample reserve capacity
- Heavy duty hoist
- Heavy duty steel wheels on bridge and trolley
- All welded jig bored and jig assembled end trucks
- Long life precision ball and roller bearings
- Large gusset plates at end trucks
- Outrigger machinery girder construction
- Heavy duty gear reduction bridge drive
- Fluid coupled bridge and trolley drives
- Full magnetic push button control
- Magnetic bridge brake

MODERN DESIGN

The crane illustrated is a typical double girder installation. For shorter spans, smaller capacities and lighter or intermittent duty Borg-Warner Industrial Cranes can supply your needs at even lower prices.

Why Borg-Warner Industrial Cranes are BETTER VALUES

Value is determined in QUALITY *and* PRICE . . . and, a price like this for superior Borg-Warner Industrial Cranes construction and performance assures you of top value for your materials handling investment.

If you want to boost your production and operating profits by making full use of overhead space for materials handling . . . if you can use the extra storage space an overhead crane will provide as compared with fork-truck stacking . . . if you can benefit from aisles and work areas cleared of floor-type handling equipment . . . it will pay you to consider a Borg-Warner top-running, motor-driven crane like this. The cost may be far less than you had imagined. One crane owner thought it would cost him nearly four times this price to duplicate his crane.

Borg-Warner Industrial Cranes offers a complete line of overhead cranes . . . for light, medium or heavy service . . . constant or intermittent service at slow, medium or high speeds . . . operation from cab or floor. Get in touch with B-W Industrial Cranes today for answers to your materials handling problems.

Industrial CRANES — INGERSOLL PRODUCTS — B-W — BORG-WARNER

Design it better . . . Make it better.

Find Your Nearest Distributor Under CRANES In The Yellow Pages

Distributors in all principal industrial cities

Borg-Warner® INDUSTRIAL CRANES

1514 S. PAULINA STREET, CHICAGO 8, ILLINOIS

Export Sales: Borg-Warner International, 36 South Wabash Ave., Chicago 3, Illinois

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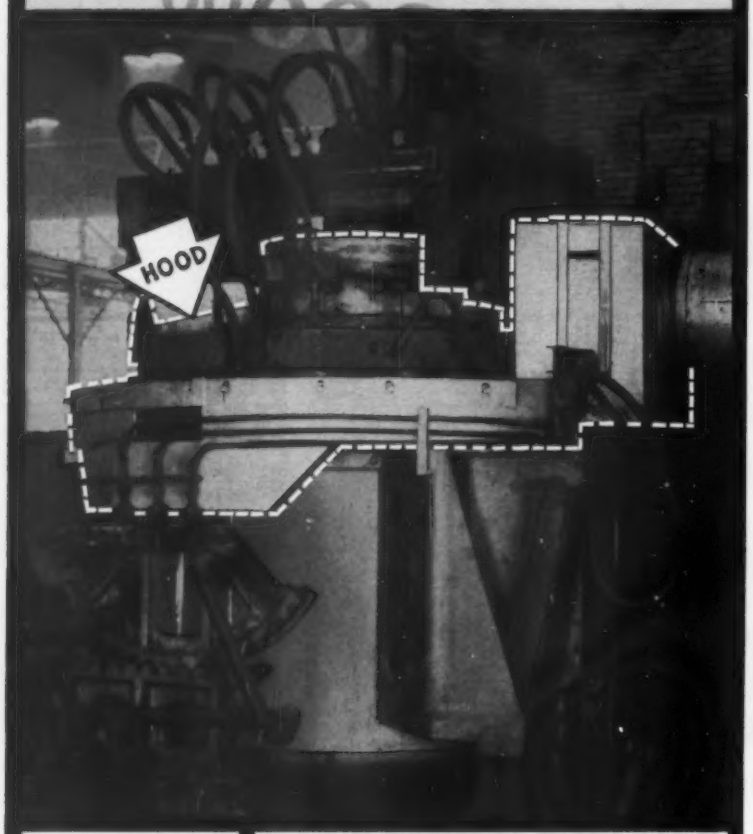
CONTROL ELECTRIC FURNACE FUMES



Pangborn offers a new concept in electric furnace exhaust hoods!

After years of development, Pangborn now offers effective control of smoke, fumes and dust from electric melting furnaces with minimum interference to furnace operations and maintenance. The hood design is based on the fundamental dust control principle of confining and capturing fumes and dust immediately adjacent the source. Effective control is secured with substantially reduced exhaust air volumes.

The Pangborn Exhaust Hood reduces the weight carried by the furnace roof; reduces hood areas subject to high temperatures; reduces electrode travel limitations and is applicable to top and side charge furnaces of all types and sizes.

With the exhaust hood connected to an efficient Pangborn Cloth Bag Collector, compliance with the most rigid air pollution control regulations is assured. For information call the Pangborn man in your area or write: PANGBORN CORP., 3200 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

Pangborn **CONTROLS DUST**

For more facts circle 617 on Reply Card

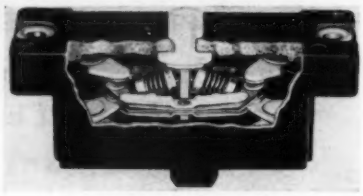
NEW PRODUCTS

(Begins on page 146)

duit range from ½ through 6 in. in standard 10-ft lengths. Larger diameters can be ordered. The conduit is chemically coated inside to make wire pulling easier. Advantages announced include light weight (one third that of steel), resistance to corrosion and rust, non-sparking and non-magnetic characteristics. Installation costs are reported less because aluminum is easier to handle and fewer supports are required for installations of larger sized conduit. Company points out that in diameters up to 1¼ in., advantages of aluminum can be obtained at a slight premium over steel, while the installed cost of aluminum conduit in larger sizes is regularly less than steel. Kaiser Aluminum & Chemical Sales, Inc.

73—LIMIT SWITCHES designed for long service

Outstanding feature announced for this switch design is a contact mechanism providing extended electrical and mechanical life as well as superior operating characteristics. These small, heavy duty switches incorporate a



movable contact assembly utilizing two compressed coil springs to provide a quick-make-and-break action. A leaf spring, carrying the contacts, provides contact pressure at all times, manufacturer states; it eliminates points of zero contact pressure and provides a non-teasing action even with slow operating motion. This spring also serves to afford sufficient contact wipe to assure good electrical contact on low voltage. Enclosed in a semi-dust tight molded phenolic case, the switch has an electrical rating of 600 v. Publication EA-154 gives details. Cutler-Hammer Inc.

74—INDIVIDUAL POLES with noble metal contacts

These individual poles with noble metal contacts are introduced to enable one or more poles of rugged industrial control relays to be used in electronic and instrumentation circuits. This enables grouping of elec-

It's NEW!

SMOOTH-ON'S ALUMINUM

METALSET® A4

EPOXY RESIN IN TUBES!

Advantages of METALSET® A4

- No solvent to cause shrinkage
- Hence, use it in *any* thickness, all at one time
- Adhesive: to steel, iron, aluminum, glass, and all porous materials like wood and ceramics
- Hard: can be drilled and tapped
- Stable: waterproof, oilproof, chemically resistant
- Flexibilized against thermal and mechanical shock
- Not only is revolutionary epoxy-resin cement easy to use:—Metalset A4 is non-flammable, hardens at room temperature, and is made with minimum-toxicity materials only

Just squeeze equal lengths from each tube. Mix. Use. Take only what you need. Keep what's left for the next job.

Typical Applications

- Stops leaks in pipes, tanks, concrete
- Bonds metal to metal, wood, concrete
- Smooths and fills dents in sheet-steel and aluminum
- Sets loose parts tight
- Caulks windows, roof fixtures, sidewalk elevators

METALSET®

Made by Smooth-On Manufacturing Company • *Established in 1895* • 572 Communipaw Avenue, Jersey City 4, N. J.

For more facts circle 618 on Reply Card

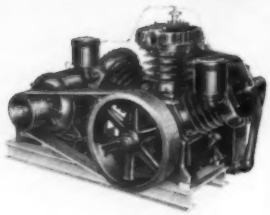
(Begins on page 146)

tronic and standard control circuits for actuation by same magnet. Poles are available normally-open or normally-closed, and may be used on any of the relays in company's Type PM line, including convertible-pole relays, universal-pole relays, time-delay relays, and latch relays.

The poles are announced as having contact tips of a palladium-ruthenium alloy, a hard material with high melting point, which is highly resistant to corrosion and tarnish and does not form a stable oxide. These properties, and wiping action designed into the contact motion, make it unnecessary to depend on arcing to break down contact surface resistance, it is noted. Thus, these poles can be used in high impedance and low voltage circuits which produce little or no arcing. Manufacturer recommends them for use in circuits of up to 600 v, drawing 0.5 v-amp or less. They are mounted in individual melamine blocks. Clark Controller Co.

Where the going is TOUGHEST the Curtis keeps going!

Sandiest FOUNDRY conditions haven't stopped this CURTIS AIR COMPRESSOR



The CURTIS C-100 two-stage air-cooled air compressor. 25-30-40 H.P.

- CURTIS-SEAL CRANKCASE
- TIMKEN MAIN BEARINGS
- SELF CENTRO-RING OILING
- AIR COOLED: NO COOL WATER REQUIRED
- PRECISION BUILT

For compressed air—industry depends on *Curtis*. Eliminate production line delays. Get more air faster . . . at lower cost. Where the going is toughest (foundry, factory or shipyard) put the CURTIS C-100 to work and forget it!—Full line of industrial compressors for ordinary and special applications.

For complete information write for illustrated folder.

OUR 105th YEAR

Curtis

MANUFACTURING COMPANY · PNEUMATIC DIVISION

Write Dept. 46, St. Louis 20, Missouri C-62

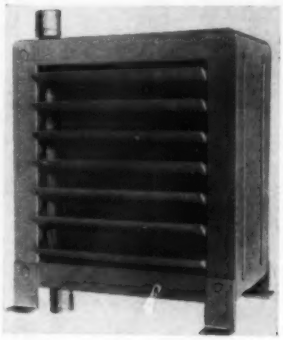
For more facts circle 619 on Reply Card

75—CHECK VALVES, steel bodied, spring actuated

These valves are designed to close automatically and silently as soon as fluid flow ceases—eliminating reverse flow. The stainless steel valve disc is center guided above and below to assure a balanced lift, which reduces wear and permits rapid seating. For installation in any position, the valves provide a large flow area, in excess of pipe diameter, which serves to reduce fluid velocity across the seat face and minimize head loss. Two types are available, in sizes from 2 to 12 in., for pressure ratings from 150 to 2500 psi, for all temperature ranges including high temperature hot water heating systems. Specifications are in Bulletin 110. Combination Pump Valve Co.

76—UNIT HEATER offers greater accessibility

Offering greater accessibility to heater interior while in installed position, this horizontal-flow unit heater is designed specifically for small applica-



tions where it may be desirable to obtain heat distribution by using one or more heaters. . . The two-piece, wrap-around casing can be removed for access to heater section without disturbing steam connections. Mechanical joint header-tube connection permits and simplifies replacement of individual tubes. Heat discharge is horizontal with individually adjustable deflector vanes. L. J. Wing Mfg. Co.

77—ANTISEPTIC SOLUTION controls fungus, mildew

Tremcide is announced as a powerful, safe antiseptic solution for control of fungus and mildew. It is specifically designed for use in bakeries, dairies, breweries, food processing firms, etc., where condensation or sweating of painted surfaces result in unsanitary conditions of mildew and fungus. Manufacturer says that in most cases, Tremcide removes necessity of scrubbing. It can be brushed on old painted

Why Every Steam Heated Unit Needs its Own Steam Trap

. . . the theory, practice and proof of "unit trapping" for top temperatures

Using an individual trap for each steam heated unit, including each separate coil, chest or chamber of a machine—pays off for the user. Here are just two examples:

1. On a creamery dryer

Drainage Method	*Air Temperature*
Restricted Blow-thru	250°
Group trapping (1 trap for 8 coils)	225°
Armstrong Unit Trapping (8 traps—1 for each coil)	**309°**

2. On a platen press

Drainage Method	*Processing Time*
Restricted Blow-thru	50 minutes
Group Trapping	35 minutes
Armstrong Unit Trapping	**25 minutes**

Why Unit Trapping Works Best

It is reasonable to assume that no two steam heated units will have *identical* condensing rates. Even the slightest difference in rate will cause a difference in steam pressure drops through the units. Here's where the trouble starts. Condensate from each unit may flow to the trap. But, what about air and other non-condensibles in the system? A difference in pressure drops too small to be indicated by an ordinary pressure gauge will permit backflow of steam from the higher pressure units to the lower pressure units. This backflow of steam may even impede flow of condensate from the lower pressure unit to the trap . . . and it will definitely impede or block off flow of air to the trap. The result is sluggish heating, reduced temperatures, reduced output, fuel waste and increased possibility of corrosion. Figures 1, 2 and 3 diagram the action.

Unit Trapping Not Costly

No engineer wants any more mechanical devices in his plant than are absolutely necessary. But, the moderate additional cost of using two or more small traps, instead of one big one, is saved over and over again in improved efficiency.

If the traps are Armstrong, maintenance is no problem. And users frequently tell us that Armstrong traps outlast others two and three to one.

Steam traps usually represent a fraction of 1% of the cost of the equipment they drain. Does it make good sense to lose 10% or more of equipment capacity to save a few dollars on traps?

Why not test Armstrong unit trapping in your plant. If you are not completely satisfied with the results you can return the traps for a full refund of the purchase price. There is little to lose—lots to gain. Call your local Armstrong Factory Representative or Distributor, or write **Armstrong Machine Works**, 9123 **Maple St., Three Rivers, Mich.**

ASK FOR the 44-page Steam Trap Book and reprint of article on Unit Trapping.

801ST

ARMSTRONG STEAM TRAPS

How Different Condensing Rates Can Slow Production

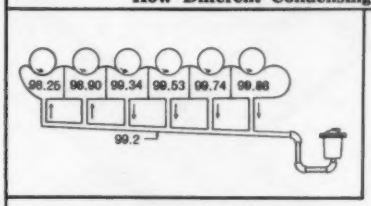


Fig. 1 This is a 6-roll ironer shortly after it has begun operating on 100 psi steam. When cold, wet material passes over chest 1, steam condensing rate is high and pressure drops accordingly. The pressure drop in chest 2 will not be as great, and so on down the machine as the material becomes progressively hotter and drier. Average pressure in the chests then is 99.27 lbs., and drain header pressure is slightly less, about 99.2 lbs. Under these conditions, steam from drain header enters chests 1 and 2 (as indicated by arrows at side of drain lines) because of pressure difference. Though condensate from chests drains by gravity, air can't leave chests countercurrent to incoming steam. Fig. 2 shows what happens next.

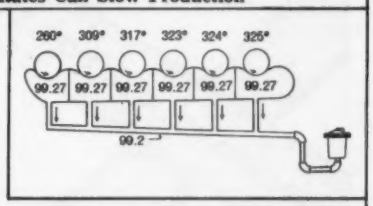


Fig. 2 This is the same 6-roll ironer after it has been operating a while. Air has accumulated in chests 1 and 2, reducing condensing rate and decreasing pressure drop. This process repeats itself down the line until pressures are as shown—that is, enough air will accumulate in each chest so that condensing rates and pressure drops of all chests will be about equal. The net result is shown in chest temperatures which are actual pyrometer readings taken on a 6-roll ironer, drained by a master trap, in a Chicago laundry. The laundry was making 337.9°F steam, but getting an average of only 309.6°F from the ironing surfaces, necessitating slow operation and frequent reruns. Then they tried Armstrong unit trapping—see Fig 3.

How Unit Trapping Prevents Trouble

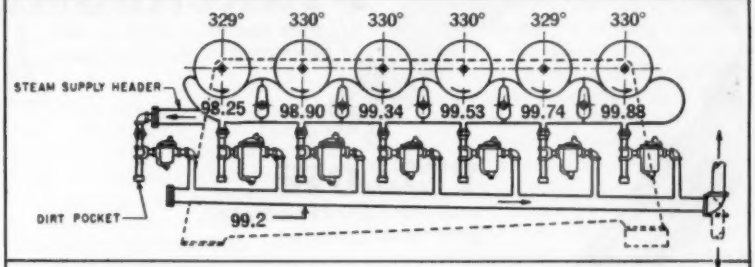
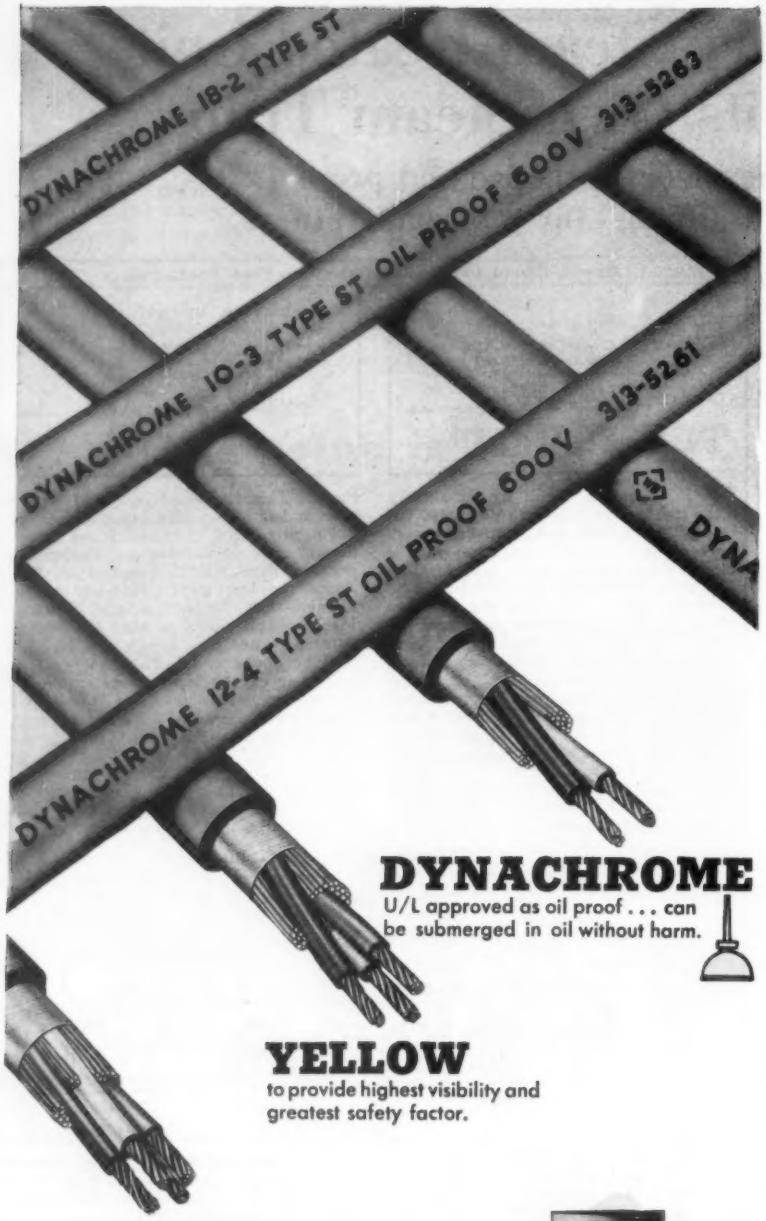


Fig. 3 This is the same 6-roll ironer, now unit trapped. Temperatures shown are also actual pyrometer readings—the average of 329.6°F is 20° higher than with group trapping. This is because air is continually removed from each chest into the drain header, and cannot get back into any chest.

For more facts circle 620 on Reply Card


DYNACHROME 18-2 TYPE ST
DYNACHROME 10-3 TYPE ST OIL PROOF 600V 313-5263
DYNACHROME 12-4 TYPE ST OIL PROOF 600V 313-5261
DYNACHROME
U/L approved as oil proof . . . can be submerged in oil without harm.
YELLOW
to provide highest visibility and greatest safety factor.
MARKED
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Write today for new FREE catalog
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For more facts circle 621 on Reply Card

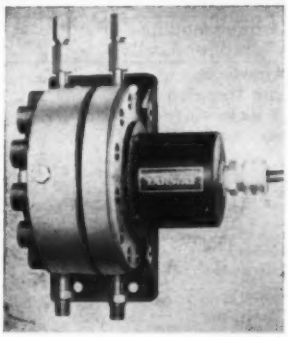
NEW PRODUCTS

(Begins on page 146)

surfaces prior to repainting to kill fungus spores and sterilize surface. No rinsing is required. The Tremco Mfg. Co.

78—PRESSURE TRANSMITTER operates remote receiver

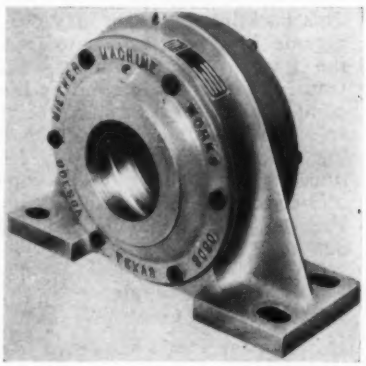
This differential pressure transmitter consists of a diaphragm mechanism in a pressure housing with pressure connections at bottom, and sensing coil which operates the remote receiver. The sensing coil is protected by a weatherproof cover. Cable connection to receiver is at right end of



this cover. Transmitter can be mounted at any convenient location. It is connected to the liquid vessel, fluid line, or other container by two tubes. At the transmitter, the tube connections lead to opposite sides of diaphragm. Variation in differential pressure on diaphragm causes change in output of sensing coil which is transmitted to remote receiver. Bulletin WG-1824 gives details. Yarnall-Waring Co.

79—PILLOW BLOCK offer application versatility

Accommodating all series of spherical roller bearings, this line of pillow blocks is said to offer increased versatility for heavy industrial use.



Hall Industrial Water Report

VOLUME 7 MARCH 1959 NUMBER 2

Let's Keep Steamed Up

Large or small, the boiler house is the heart of most industrial plants. It must make steam to maintain production. When there is trouble, production losses from lack of process steam or power may be far more costly than the actual repairs.

Water problems are high on the list of the causes of unscheduled boiler house outages. To minimize these problems, skilled Hall engineers are ready to help you establish a sound, practical water conditioning program. And they can help you with other water problems in cooling systems, process operations and waste disposal.

Spreading Oil on the Water

Due to construction work, a small plant had only one boiler available. Then a fuel oil heater sprung a leak. Suddenly the one boiler had about 200 gallons of oil in it.

Ordinarily the boiler would have been shut down for a complete cleaning. However, that was not considered possible at the time of the accident. Recognizing that he was in real trouble, the engineer called Hall Laboratories.

Fast action was necessary. Most of the oil had to be removed from the boiler without taking it out of service for more than a few hours at night. Hall engineer C. F. Raines fed large quantities of caustic soda and wetting agent while lightly firing the boiler, venting steam to the atmosphere and blowing down heavily. Then the boiler was overflowed through the vent. This took from midnight until 4:00 a.m.

When the boiler was put back on the line at 5:30 a.m., the usual zeolite-treated feedwater was replaced with hard raw water so sludge to absorb oil would be produced in the boiler water. Several days later there was time over a week-end to do a more complete boiling-out job.

In spite of the heavy oil contamination the emergency action kept the boiler in service. Furthermore, when a quick inspection was made after the week-end boil-out there was no evidence of oil on the internal surfaces.

Well Water Changes For the Worse

About three years ago there was a radical change in the well water used by an eastern town. Hardness soared from a constant 8 to 9 gpg to a fluctuating 25 to 40 gpg.

A small local factory had successfully used the softer well water for boiler feedwater by pretreating it with lime and soda ash in a hot-process softener. Trouble came with the new well water because the widely fluctuating, high hardness made adequate control of chemical feeds well-nigh impossible. Calcium carbonate deposition completely plugged the vent condenser on the deaerating heater and stopped a feed pump by causing it to bind.

Hall engineer F. R. Duesing recognized that water conditioning procedures would have to be adjusted to accommodate fluctuating hardness of the feedwater. He therefore used a dispersive to stop the deposition of calcium carbonate in the pre-boiler system. This was the answer. After more than two years' operation there has been no further scale formation on the feed pumps or deaerator vent condenser.

Blowdown was another problem. It was excessively high because of the high solids concentration of the treated well water. By instituting the use of Hagan C-1 Antifoam, Duesing was successful in doubling the normal concentration of dissolved solids in the boiler water without impairment of steam quality. Subsequent inspections of the turbine and boiler superheaters have confirmed that steam quality is good.

Removing Old Scale From Boilers

Scale forms in a boiler in response to specific physical and chemical circumstances. Significant changes in water composition, chemicals used for conditioning, or amounts of chemicals fed can cause the scale to slough off. Accumulation of loosened scale can then upset circulation, obstruct blowdown connections, plug tubes and headers and result in unsafe operation and repairs.

To avoid trouble, a plant with dirty boilers should preferably clean them mechanically or chemically before changing to a more effective water conditioning program. If this is not possible for some reason, such as steam load requiring that all boilers be kept in service, the recommendations of the Hall engineer should be closely followed. He will base his recommendations for establishing desired boiler water conditions on his experience in getting rid of old deposits slowly enough to avoid serious difficulty.

Thermocouples Tell Tube Failure Story

Thermocouples, used to record tube temperatures, were resorted to by a midwest paper mill to warn of scale deposition in the water walls of their boiler. Sludge and sodium aluminum silicate (analcite) scale had caused trouble, and zeolite softening of makeup water didn't stop the analcite. Readings showed tube temperatures went from 450F to over 550F in 60 days.

Hall engineer M. L. Mitchell recommended a newly developed Hagan dispersive which is especially effective in promoting tube rinsing in regions of high heat transfer. The results were dramatic. Tube temperatures leveled off—and when the boiler was next cleaned, continued use kept temperatures at normal levels.

Water is your industry's most important raw material. Use it wisely.

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information on how the Hall System can help you solve your particular water problems, write, wire or call address below.

HALL LABORATORIES
DIVISION OF HAGAN CHEMICALS & CONTROLS, INC.
HAGAN BUILDING, PITTSBURGH 30, PA.
In Can da: Hagan Corporation (Canada) Limited, Toronto

Hall Laboratories—Consultants on Procurement, Treatment, Use and Disposal of Industrial Water

For more facts circle 622 on Reply Card

NEW PRODUCTS

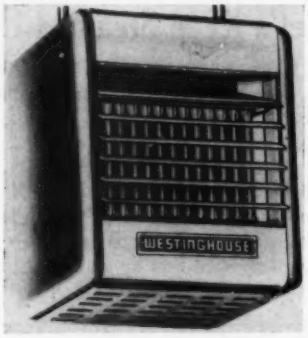
(Begins on page 146)

Through interchangeable end caps, 20 basic housings accommodate 94 separate bearings—some housings taking eight bearing sizes and 11 shaft diameters. To install a different bearing size, you simply fit new end caps on the housing. For further versatility, housings are center-grooved, and end caps have a second connection for side lubrication Miether Machine Works.

Use the Reader Service Cards provided on pages 221-222 to ask for more information on these products. Circle item numbers of products in which you are interested.

80—UNIT HEATERS, gas fired, in 10 sizes

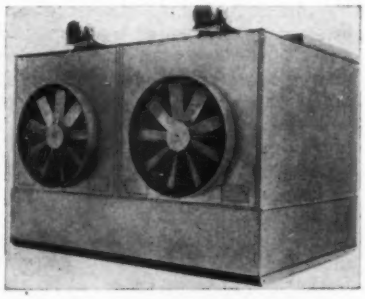
These unit heaters, available in 10 sizes from 25,000 to 250,000 Btuh, incorporate a contoured aluminized steel heat exchanger design with combustion occuring within individual tubes for maximum heat transfer. They have automatic safety controls and are available for use with manufactured, natural, mixed, liquid



petroleum gas and liquid petroleum gas-air mixtures. Cast-iron air adjustment shutters control primary air to the gas flame, and adjustable louvers permit variation of discharge air to suit installation requirements. Fan motors are rated at 115 v, 60-cycle, single-phase current and have automatic reset-type thermal overload protection. The seven smaller units have a permanent lubricated shaded-pole motor, the larger units, permanent capacitor motor requiring periodic lubrication. Sturtevant Div., Westinghouse Electric Corp.

81—COOLING TOWERS in capacities to 400 gpm

Three new models extend the capacity range of the packaged Aquatowers to 120 tons. The new models are two-fan units with divided hot water basin and dual cooling chambers



mounted on a "common" cold water collecting basin. The two-fan design permits single-cell operation, if desired, providing flexibility of operation and close control of cold water temperature. Increased capacities available make these cooling towers suited for many process water cooling applications in the 250-to 400-gpm range. Aquatowers are shipped as a unit. The Marley Co.

Where water is used, process equipment and storage tanks are sure to corrode unless protected by an E.R.P. cathodic protection system. Even with these concrete high rate clarifiers at the St. Regis Paper Company plant near Jacksonville, Florida, it pays to protect the metal parts with an E.R.P. cathodic system.

Engineering PLUS...
E.R.P. cathodic protection pays off in maintenance savings

In industry or public service, water treatment is a big investment. To protect that investment in water treatment equipment could be a tremendous maintenance job. Even with concrete clarifiers, it pays to use E.R.P. cathodic protection. When there are metal tanks involved, just one cleaning and painting can cost more than a complete E.R.P. cathodic protection system.

From preliminary design to continuing periodic corrosion surveys, experienced corrosion engineers measure, analyze and design specifically for your corrosion problems. That is the only way corrosion can be virtually eliminated.

E.R.P. engineering plus prevents corrosion of water storage tanks, water and sewage treatment structures and pipelines. For full information on how E.R.P. can help you save maintenance costs, write for bulletin E-46.72.

ERP CATHODIC PROTECTION SINCE 1935

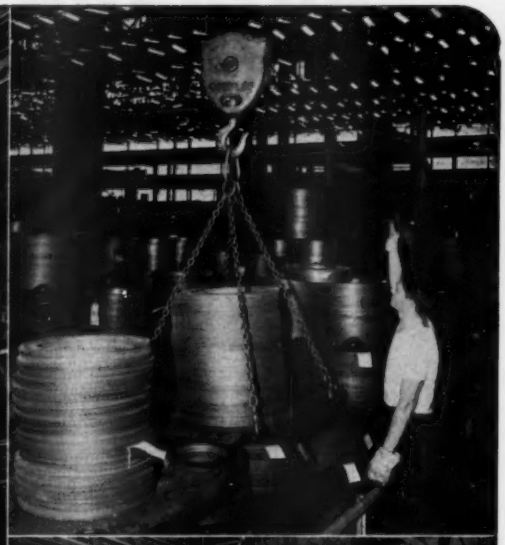
ELECTRO RUST-PROOFING CORP.
A SUBSIDIARY OF WALLACE & TIERNAN INC.
30 MAIN STREET, BELLEVILLE 9, NEW JERSEY
CABLE: ELECTRO, NEWARK, N. J.

For more facts circle 623 on Reply Card

CRANES *SPEED* PALLET-HANDLING

Store More—Eliminate Congestion—Cut Maintenance—Save Floors

Pallets loaded with motor stator laminations are easily lifted and moved with these floor-operated Tramrail cranes. Note that the entire area is jam-packed, with no lost aisle-way space. The ease with which any loaded pallet can be picked up and handled to awkward-to-reach places is a distinct advantage.



Pallets with 32 100-lb. kegs of nails are piled high in storage with the cab-operated Tramrail crane and open-side pallet lift.

THERE'S no height limit when stacking palleted materials with Tramrail cranes. 20 ft.—30 ft.—40 ft. or higher are easy. Your materials and building are the only limiting factors.

Often 50% and more materials on pallets can be stored in a room served by overhead cranes. Narrowing of some aisles, elimination of others, plus higher and closer piling make the difference.

Pallet loads are moved safely and speedily overhead where the path is always clear and unobstructed. Placing this handling job near the ceiling, reduces floor congestion and frees much of it for other purposes.

Maintenance costs for Tramrail cranes are extremely low, usually only a few percent of that for power-operated floor trucks. No engines to overhaul. No clutches to replace. No brakes to re-line. No batteries to charge. No irritating gas fumes. And of importance, extra heavily reinforced floors are not required and costly floor damage because of materials handling is eliminated.

When considering pallet handling or any materials handling, it will pay you to look into the tremendous advantages that Cleveland Tramrail cranes offer.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
7578 East 284th Street, Wickliffe, Ohio

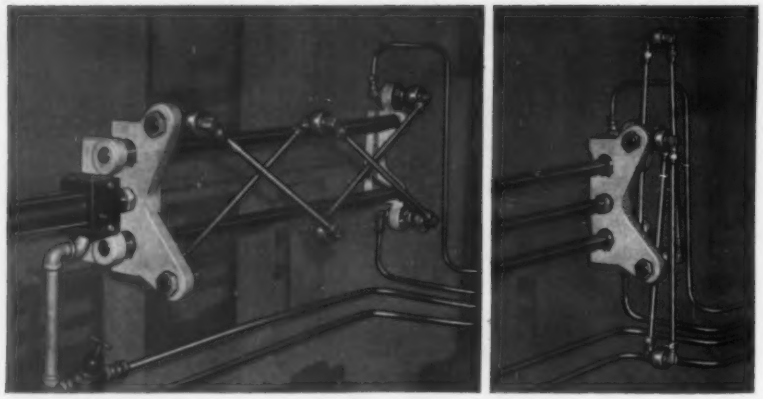
CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

For more facts circle 624 on Reply Card

IN EQUIPMENT DESIGN ■

CHIKSAN SWIVEL JOINTS

SMOOTH OUT KNOTTY LINE PROBLEMS



STEEL LINES FOLD LIKE AN ACCORDION

Connected to a moving head, these compact swivel jointed all-metal hydraulic lines flex and fold like an accordion on this automatic bottle unpacking machine.

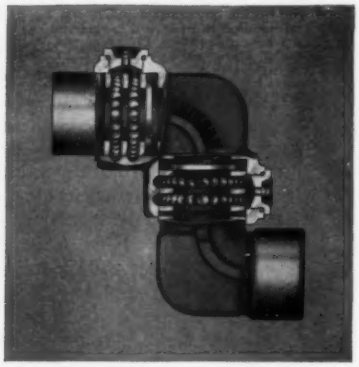
When a machine's moving parts cause tight bend or twist on hose lines, Chiksan Swivel Joints provide a ready solution. When design dictates the use of metal lines, Chiksan Swivel Joints allow rubber-like flexibility. In fact, wherever line flexibility is required, designers and maintenance engineers know it's just good business to call on Chiksan. Precision made Chiksan Swivel Joints with their infinite service life, full 360° rotation and high safety factor, quickly pay for themselves by minimizing hose replacement and eliminating costly line failure, fluid loss and downtime. If your equipment hose lines require frequent replacement due to torsion or bend radii fatigue, or if flexible all metal lines are in order, contact Chiksan. A nearby representative will call, analyze your requirements, and make specific recommendations. Write today for his name.

NO HOSE BURST HERE

These Chiksan swivel jointed steel lines on a die casting machine eliminate damaging hose ruptures, reduce fire hazard, fluid loss and setup time by 75%.

NO BEND FATIGUE HERE

This highly specialized lens grinder utilizes Chiksan Swivel Joints to eliminate tight hose bend as the multiposition head is shifted from one grinding position to another.



LOOK INSIDE A SWIVEL JOINT

Detailed attention to detail. Precision machining and specific packing seals for specific services. These are the quality-plus features built into every Chiksan Swivel Joint.

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Well Equipment Mfg. Corp. (Division), Houston 1, Texas • Subsidiaries: Chiksan Export Company • Chiksan of Canada, Ltd.

For more facts circle 625 on Reply Card

NEW BOOKS

for the plant engineer

Diesel and Gas Engines

STANDARD PRACTICES FOR STATIONARY Diesel and Gas Engines. Size 9 by 6 in. approx; 219 pp including index; illustrated; cloth bound; 1958 edition. Published by Diesel Engine Manufacturers Association, 2000 K St., N. W., Washington 6, D. C. Price $5.00.

THIS UPDATED edition of the DEMA standard practices is a work that had the preparatory attention of an outstanding committee of engineers. The book reflects the thinking not only of builders but also of other interested groups. Material found in this publication can be of help not only to those concerned with engine operation but also prospective buyers.

Here are some of the principal topics treated in the twenty chapters: engine construction; starting systems; cooling water systems; fuel oil storage and handling systems; gaseous fuels; selection of engine sizes; bids and specifications; and operation and maintenance.

Coated Abrasives

COATED ABRASIVES—Modern Tool of Industry. Size 9¼ by 6¼ in.; 1958 edition; 426 pp including index; illustrated; cloth bound. Published by McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 36, N.Y. Price $8.50.

IN THIS COMPREHENSIVE guide on coated abrasives, factors are described dealing with the effective use of abrasives in metalworking, woodworking, glass and plastics industries, in applications ranging from heavy material removal to fine polishing.

The book includes material on strip scouring, pre-plate finishing, contour finishing, and automatic machinery. Manufacture of abrasives is also discussed as well as such special topics as cutting oils, coolants, and lubricants for use with coated abrasives.

Management

THE DECISION MAKERS. Size 11¼ by 8⅝ in.; over 180 pp; illustrated; cloth bound. Published by the Bureau of Business Practice, Div. of Vision Incorporated, 1000 Garfield Ave., New London, Connecticut. Price $10.00—standard edition; $15.00— deluxe.

TOGETHER WITH narrative case histories this book contains question and answer interviews with leading management personalities. The information in the publication required months of interviewing and research. It is based on a business magazine series, "Profile of a New Kind of Manager."

In one of the 16 chapters, for example, President Lawrence A. Appley of the American Management Association discusses the chief qualities a manager must have. Another chapter deals with the president of an Ohio company that was deeply in the red, about to fold. But within a few years, leadership took it to the top. Still another section goes into profit planning of a well-known midwestern firm. The book is climaxed with a chapter on managerial timber, the college recruit.

Ion Exchange

DOWEX—ION EXCHANGE. Size 9¼ by 6⅛ in.; 1958 edition; illustrated; 75 pp; cloth bound. Published by the Dow Chemical Co., Midland, Mich.

COPIES of this book are available to company departmental libraries and technical personnel by writing on com-

For BIG performance...
The BIG change is in ALL NEW
G. I. FANS
...featuring flat radial blade wheels
Workhorse durability plus precision machine efficiency equals BIG performance. All new G. I. Fans incorporate advanced aerodynamic techniques that combine improved efficiency with all the advantages of the flat radial blade design. Three wheel types are offered to provide rugged performance for virtually any type application.
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NEW BOOKS

pany letterhead. Established ion exchange users can find helpful information in this publication and also those interested in using ion exchange principles for solutions to production problems.

Application techniques in chemical processing are described, with illustrations of laboratory equipment used. The book includes material on types and properties of ion exchange resins, ion exclusion and retardation. Also described in this edition are the characteristics and physical properties of resin beads.

On Punched Cards

PUNCHED CARDS. Size 9¼ by 6¼ in. approx; 1958 edition; 697 pp including index; cloth bound. Published by Reinhold Publishing Corporation, 430 Park Ave., New York 22, N. Y. Price $15.00.

YOU WILL find in this book principles and methods which apply to small files or the largest, and also descriptions of a wide range of cards and equipment. The volume which deals with both hand and machine-sorted cards can serve as an elementary instruction manual as well as an advanced handbook.

Material in this book has been prepared by specialists with years of experience in developing the methods explained. A portion of the numerous subjects treated in this publication includes the following: Use of punched card techniques in preparing reports, papers, and books; application of random codes for literature searching; mathematical analysis of coding systems; and data processing machines for filing and retrieving technical information. The book also includes a bibliography on uses of punched cards.

Printed Circuits

HOW TO DESIGN AND SPECIFY Printed Circuits. Size 9¼ by 6⅛ in.; 94 pp; 1958 edition; illustrated; cloth bound. Published by the Institute of Printed Circuits, 27 East Monroe St., Chicago 3, Ill. Price $5.00.

MANY ILLUSTRATIONS are included in this book which reports on: advantages of printed circuits; layout and design considerations; selection of materials; terminology; and production methods. This comprehensive technical manual also contains information on multiple soldering techniques, service and repair, and assembly.

This guide is a result of group effort; it reflects experience and skills of leading manufacturers of printed circuits who are members of the Institute of Printed Circuits.

Programming

ELEMENTARY MATHEMATICAL PROGRAMMING by Robert W. Metzger. Size 9 by 6 in. approx; 266 pp including index; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N.Y. Price $5.95.

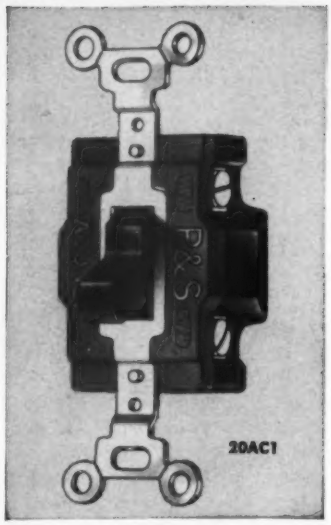
TREATING the subject of mathematical programming in an overly generalized way detracts from its usefulness. At the other extreme, if the treatment is too technical, then a good grasp of the present material limits itself to individuals with suitable mathematical backgrounds. This book avoids these extremes and provides an elementary description of mathematical programming.

Various methods are presented through typical but simple problems in a logical step-by-step pattern. Examples in the book illustrate, in detail,

(Continued on page 208)

P&S

SUPER AC SWITCHES



- Extra large terminal screws.
- Back or side wired.
- Extra large silver buttons.
- Can be used to *full rated capacity* on inductive loads.
- Heavy plastic body.
- Contacts in upright position mounted at point of least vibration.
- Available in 15 and 20 Amp. types.

Send for complete catalog.

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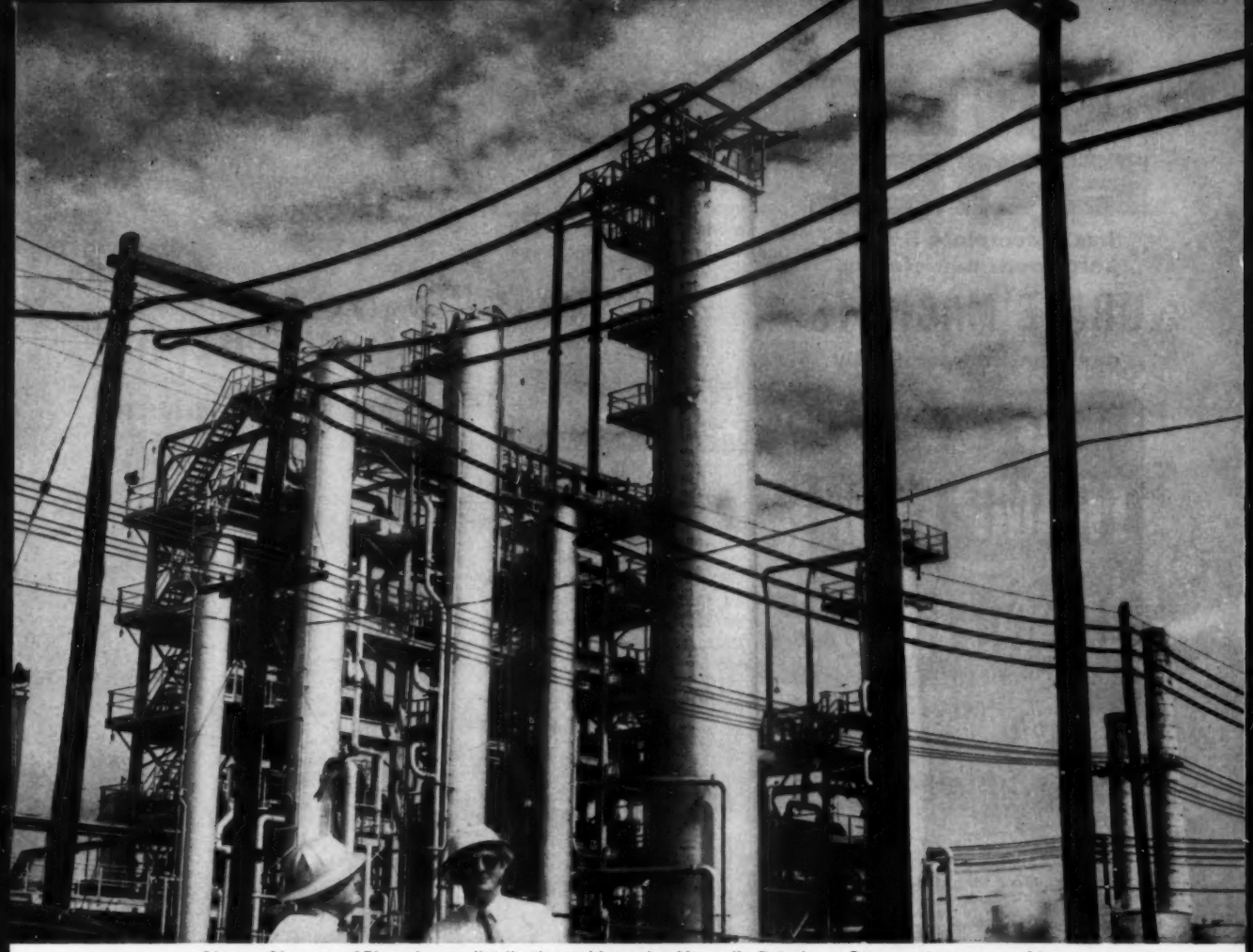
MAKE THE COMPLETE JOB COMPLETELY P&S

For more facts circle 627 on Reply Card



Okonex-Okoprene 15kv primary distribution cables solve Magnolia Petroleum Company's space problem and climate problem (wet and salty atmosphere) and provide greater safety in its Beaumont refinery.

Magnolia Refinery improves voltage regulation, beats humidity with Okonex-Okoprene cables

The giant 1,500-acre Magnolia Petroleum Company refinery, located on the broad Gulf Coast Plain, generates and uses 900,000 kilowatt hours a day, more than its neighboring city of Beaumont, Texas. A cable breakdown here could cause costly damage to equipment and the material in process (more than 400 oil products are manufactured). The entire cable system must serve Magnolia's round-the-clock operation without interruption in the face of the high moisture-saline content of the air, plus the chemicals and intense heat used at many of the processing units.

For the 15kv primary aerial loop distribution system, Magnolia's engineers selected shielded Okonex-Okoprene cables. These butyl-base insulated, neoprene-sheathed constructions saved space, eliminated safety problems and provided improved voltage regulation far superior to previous open wire constructions and other insulated cable constructions studied. In addition, their excellent moisture, heat and corrosion resistance were important assurances of maximum service life.

Okonex-Okoprene, in 3,000 to 15,000 volt constructions, was also used for trunk feeders to and from substations, tie lines and motor leads installed both aerially and underground.

To help you specify the optimum cable for your important power and control cable needs, contact your Okonite representative or write for the free Bulletin PE-1117, "How to choose insulated cable," to The Okonite Company, Passaic, New Jersey.

where there's electrical power . . . there's **OKONITE CABLE**

6339

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has a *complete line* of permanent non-electric

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STOP TRAMP IRON and IRON FINES

ONLY ERIEZ Grate Magnets offer the widest selection of models, sizes and construction in the widest price range . . . either strong, proved-in-use ALNICO magnetic elements or new, low-cost CERAMIC material.

ONLY ERIEZ has units designed for *your exact needs* – with the most effective, most powerful magnetic fields – protected by U. S. and foreign patents.

ONLY ERIEZ – world's leading producer of magnetic equipment for industry – has the experience and know-how to provide the most effective Grate Magnets:

For tramp iron separation – Eriez Alnico-powered Grate Magnets **proved stronger** than all comparable units in extensive, controlled tests. Alnico is also highly effective for fine-iron separation.

For fine-iron separation – Eriez Ceramic Grate Magnets proved best for efficient, economical removal of fine-iron in free-flowing materials.

All Eriez Grate Magnets are non-electric, self-contained. Operate without any wires or attachments. Designed to prevent choking possibilities caused by bridging of iron and material accumulation. First cost is only cost. Ruggedly constructed; magnetic tubes permanently secured to frame, can't fall into flow line. No operating or maintenance costs. Available in: Wing-Type, Drawer-Type, Multiple-Bank, Rotary-Type, Odd-shaped Models, Housed Units, and Housed Vibratory Units.

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Eriez Mfg. Co., 71-Q Magnet Dr., Erie, Pa.

ERIEZ

For more facts circle 629 on Reply Card

NEW BOOKS

techniques involved in formulation and analysis of solution methods.

Among the principal topics discussed in the book are the following: computers and mathematical programming; production planning; stock slitting; material handling scheduling; and job and salary evaluation.

Welded Machine Design

ARC WELDING IN MACHINERY DESIGN and manufacture. Size 9 by 6 in. approx; 209 pp; 1958 edition; illustrated; cloth bound. Published by the James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio. Price $2.00 in the U.S.A.

A SOURCE OF IDEAS for the efficient use of steel in machinery, this book can be helpful for providing answers to questions regarding steel construction resulting in lower costs and improved performance.

The book outlines problem approach and provides a series of check lists and suggestions. It contains brief reviews of 73 welded designs of a wide variety of machines. Ideas are illustrated and explained briefly to indicate their general application and significance.

The Curtain Wall Story

THE CONTEMPORARY CURTAIN WALL: Its Design, Fabrication and Erection by William Dudley Hunt, Jr. Size 7 by 9¾ in.; 462 pp including appendix and index; illustrated; cloth bound. Published by F. W. Dodge Corp., 119 West 40th St., New York 18, N. Y. Price $12.75.

In ten profusely illustrated chapters, the author discusses the potentialities —and the problems—of curtain wall construction. Beginning with a definition of a curtain wall, he elaborates on its functions as a filter and flexible barrier. Thorough discussion is given to the basic elements: frame, facing, fenestration, joints, fasteners and backup.

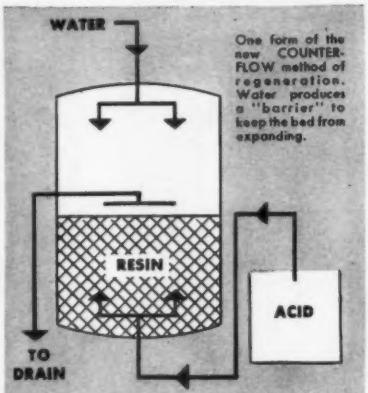
Subsequent sections of the book analyze and compare the various materials of construction of the walls (which by reason of their diversity, require almost half the volume to cover); here is a comprehensive study of the advantages and disadvantages of every known material from which curtain wall panels can be made.

Methods of erection of the panels on the building frame are given thorough treatment, and the author closes with an appraisal of the future of the curtain wall in building design.

ILLCO-WAY ionXchange

COUNTERFLOW*

REGENERATION OF ION-EXCHANGERS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One form of the new COUNTERFLOW method of regeneration. Water produces a "barrier" to keep the bed from expanding.
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* "COUNTERFLOW" is the trade mark of Illinois Water Treatment Company equipment utilizing a distinctly new principle of regeneration. Pat. pending.

"COUNTERFLOW" is a method whereby upward regeneration, which has long been recognized as most desirable, is successfully accomplished by establishing a "barrier" at the resin face.

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- **Chemical company in Middle West, 480 ppm TDS in raw water. Expected cation leakage with conventional regeneration, 9 ppm; with COUNTERFLOW, only 1.2 ppm.**
- **Distillery in Middle West. TDS in raw water, 575 ppm. Expected cation leakage with conventional equipment, 6 ppm; with COUNTERFLOW, is actually only 1.5 ppm.**
- **Western power plant, converted to COUNTERFLOW. Savings in acid reduction, $16,000.00 per year. TDS in raw water, 342 ppm. Predicted cation leakage from curves for conventional design equipment, 4 ppm; with COUNTERFLOW, actually only 1.6 ppm.**

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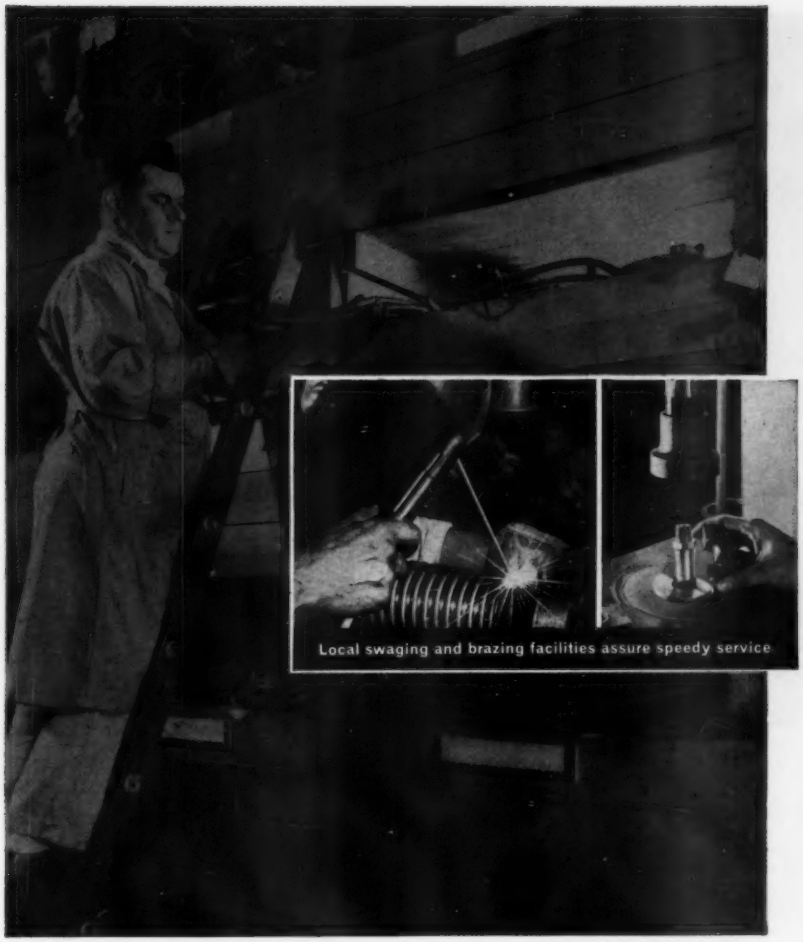

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Your FLEXONICS distributor is an industrial hose specialist . . . depend on his ability to serve quickly and to your complete satisfaction.

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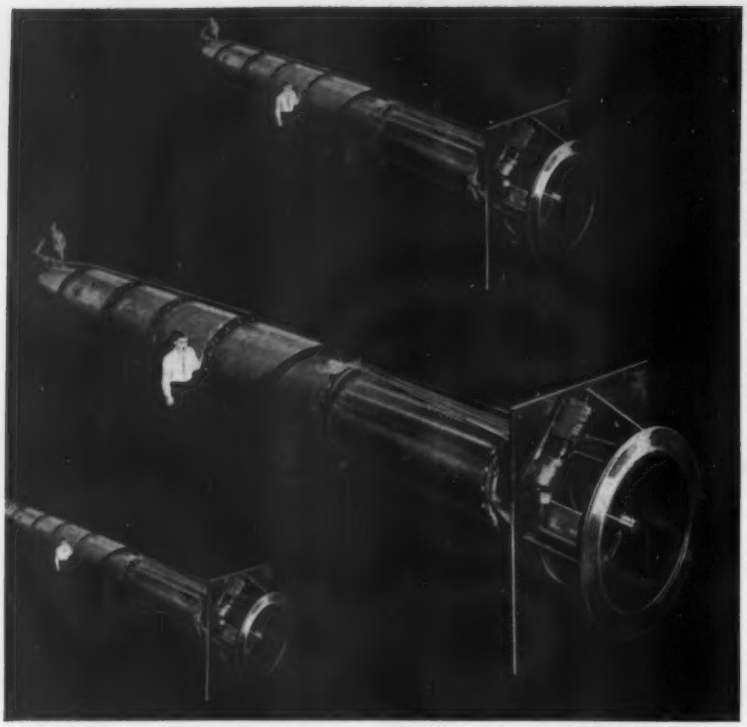

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With nearly three-quarters of a century of pump design and manufacturing experience, the Economy Pump Division of C. H. Wheeler is well qualified to solve pump problems of any size.

Wheeler-Economy Axial and Mixed Flow Pumps, for example, can handle larger volumes of liquid at lower cost than any other type of pumping equipment. They are custom-made in capacities of from 5000 to well over 220,000 gpm. Principal applications are flood control, drainage, irrigation, water supply and condenser circulation.

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Are you wasting all kinds of time selecting the right wire and cable for your job?

MEET THE MAN

WHO CAN HELP YOU...

. . . on page 162

INDUSTRIAL FILMS

Corrosion Film

WHAT CAUSES anodes and cathodes to form on steel surfaces, how they produce electrolytic corrosion and what you can do about it are covered in this film on corrosion

Other items discussed are: inhibitors, alloys, hot-dip galvanizing, cathodic protection, metallizing, organic coatings and inorganic zinc coatings.

Case histories show how corrosion

Surface preparation, including sandblasting, gets special attention in film.

problems are solved in various industries. The film is in 16 mm. color with sound. Running time: 19 minutes. For showing, write to Amercoat Corporation, 4809 Firestone Blvd., South Gate, California.

Drawing Reproduction Techniques

DOLLAR SAVINGS are the star of the informational movie, "Photo-Reproduction." Produced for showing to industrial, business and professional groups, particularly engineering management, the movie illustrates how organizations can raise efficiency and cut drafting cost by putting photoreproduction techniques to work.

From reclamation of illegible originals to cut-and-insert work on photographic engineering intermediates, the 23-min color film accents potential savings.

Focusing on typical cost problems, the movie describes: use of intermediates as "second originals," from which shop and field prints are run off in desired quantities; use of photodrafting techniques to cut drawing revision time to a minimum; the photodrawing technique, which can put a combined photograph and assembly

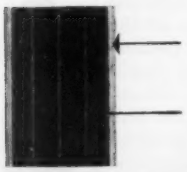
(Continued on page 212)

Floor Plan flexibility... with Gold Bond Asbestone Panels

Gold Bond® Asbestone Panels give your plant complete interior and exterior wall flexibility. Can be put up or taken down as interior partition walls in a few hours. Whole floor plans can be changed overnight. Asbestone Panels are fire-resistant, they greatly reduce sound transmission and are maintenance-free.

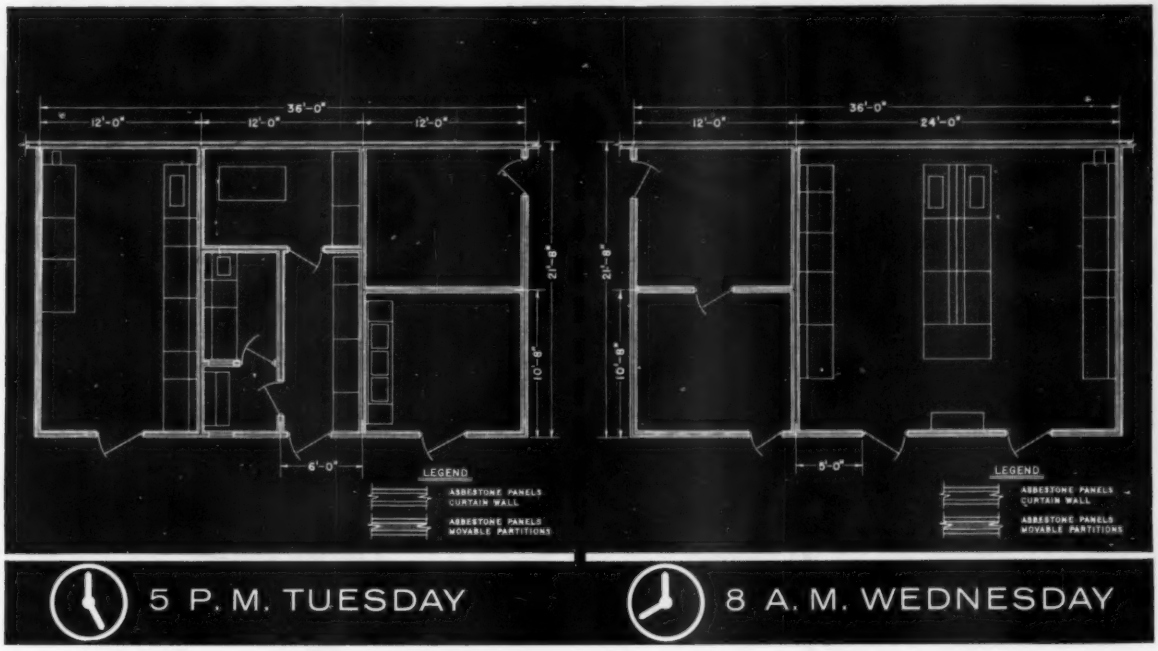
As outside walls, Asbestone Panels provide insulation. Their rugged non-combustible facing sheets are immune to weather, moisture, fumes and rot. They go up fast as permanent or floating end walls to allow for future expansion.

For complete information about economical Asbestone Panels, write for free technical bulletin: Dept. PE-39, National Gypsum Company, Buffalo 13, N.Y.



1/8" thick non-combustible Asbestos-Cement Flat Sheets for outside-inside walls.

Asphalt impregnated structural insulation core laminated under hydraulic pressure.



Gold Bond
BUILDING PRODUCTS

a step ahead of tomorrow

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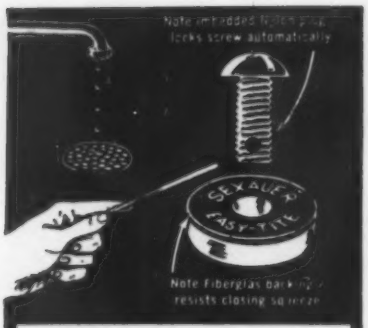

NEW WAY TO

Prevent Faucet Leaks!

★ **9 out of 10 washers are fastened with screws that are TOO LONG or SHORT. The screws quickly loosen; the loosened washers are destroyed thru grind and squeeze of opening and closing faucets.**

34 years of research uncovers new solution

★ **Now, NEW (Patented) 'Sexauer' SELF-LOCK Monel screws, with an imbedded expanding NYLON PLUG, lock at the required depth AUTOMATICALLY, hold washers FIRMLY! Made of rustproof, non-corroding Monel, heads don't twist off, screw slots don't distort. They are easily removed when necessary, can be re-used repeatedly.**

★ **Used with NEW 'Sexauer' EASY-TITE faucet washers, they make a combination that outlasts past faucet repairs "6-to-1"! EASY-TITES are made of super-tough, pliable du Pont compound (neither rubber nor fibre) and reinforced, like a tire, with a vulcanized layer of Fiberglas. They resist distortion and splitting from shut-off grind and squeeze.**

Hidden costs of faucet leaks!

Faucet leaks are costly! As authenticated by Hackensack, N. J. Water Co. and American Gas Association, stopping just ONE PIN-HOLE SIZE (1/32") LEAK can reduce water waste 8,000 gal. quarterly. If a HOT WATER FAUCET LEAK, water and fuel savings JUMP to over $7.58 QUARTERLY—plus additional savings on MATERIALS, LABOR and costly FIXTURE REPLACEMENTS!

NEW SELF-LOCK screws and EASY-TITE faucet washers are just TWO of the "SEXAUER" line of over 3000 TRIPLE-WEAR plumbing repair parts and Pat'd. precision tools.

A "SEXAUER" Technician in your vicinity will make our NEW 126 page Catalog "H" available. He will gladly consult with you regarding a SURVEY of your plumbing fixtures to determine correct repair parts required and establish reasonable stock levels that avoid both overstocking and shortages—thus providing for efficient stock arrangement and control—all without obligation. WRITE TODAY!

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SEXAUER

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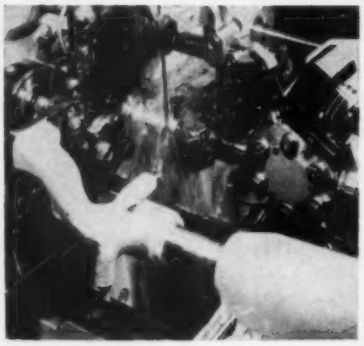
diagram at every work bench, expedite handling of piping, wiring and various construction operations.

Industrial, business and professional groups or individuals may borrow copies of the film by writing to: Graphic Reproduction Division, Eastman Kodak Co., Rochester 4, N. Y.

Applications of Automatic Screw Machine

EIGHT PRACTICAL applications of the latest design of automatic screw machine are shown in a new 16 mm color sound film. Utilizing close-up views and slow motion, some of the sequences detail the relative position of tooling during close timing operations. Standard and special attachments with explanations of the tool engineering involved in their practical application are featured. Running time is 35 min.

"Engineered Screw Machine Tool-



ing Applications" is available on a no-charge loan basis from Brown & Sharpe Manufacturing Co., Machine Tool Div., Providence, R. I. and from local Machine Tool Division sales offices.

Using Audio-Visual Equipment

EFFECTIVE showing of movies, slides and slide films depends largely upon the thoroughness of preparation and the smoothness of presentation according to the illustrated booklet "Foundation for Effective Audio-Visual Projection."

Although especially designed for the person who utilizes audio-visual equipment professionally, the book has many helpful suggestions to anyone who puts on slide or film presentations.

Included in the book are sections on how room facilities, seating plan and screen size and type, loud speaker location, projector location, image brightness and projector distance con-

(Continued on page 214)

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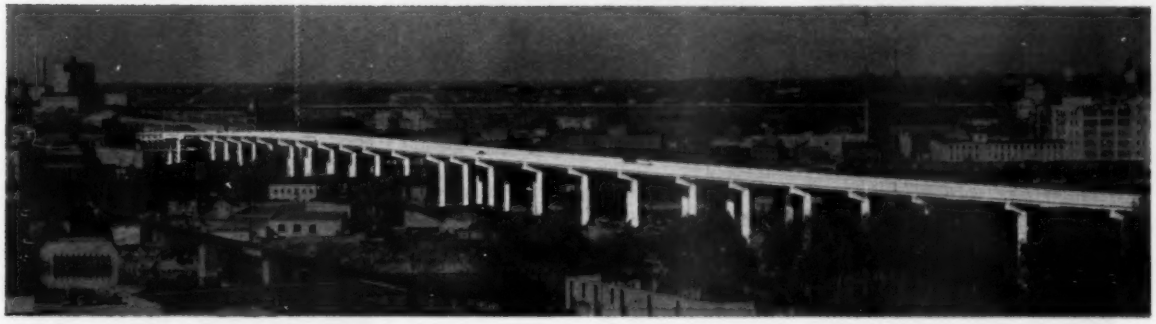
Richmond-Petersburg Turnpike statistic:

95 bridges and overpasses

Sampson Aluminum Paint coats all structural members

Structural members of all bridges on the 35-mile Richmond-Petersburg Turnpike gleam with durable, weatherproof Sampson Aluminum Paint, made by Sampson Paint & Color Co., Richmond, Va.



Sampson Aluminum Paint adds to the impressive beauty of the James River Crossing.

Newest of the nation's super roads, the Richmond-Petersburg Turnpike transforms a historic route into a modern engineering triumph. With the motorist in mind, the builders ruled out traffic delays by providing 95 bridges and overpasses. With the taxpayer in mind, they coated all structural members of these bridges with Sampson Aluminum Paint, made with ALCOA® Pigment.

Lasting beauty and low maintenance make aluminum paint the choice of most bridge and highway builders . . . and plant engineers. Best protection on weather-exposed metal surfaces, a good aluminum paint like *Sampson* is economical, has amazing hiding power, can be touched up without objectionable color contrast. And at night, reflective aluminum paint is remarkably visible—an important safety factor.

ALCOA does not make paint, but ALCOA Pigments are used in more aluminum paints than any other brand. Special formulas have been developed by paint manufacturers like *Sampson* to solve individual problems. These paints actually cost less, last longer, give utmost protection against heat, cold, sun, rain, smoke and fumes.

Write today for our two free booklets, *Painting With Aluminum* and *Aluminum Asphalt Roof Coatings Make Time Stand Still.* Use the coupon.

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Company_____

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The PORTER CENTER-CUT CUTTER — in 6 sizes, for cutting up to ¾". Our most popular tool. Ideal for general free cutting of soft and medium hard steel. Other models for HARDER METALS.

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The PORTER WORK-STATION CUTTER — in 3 sizes, up to ½" capacity. For continuous cutting operations it can increase the metal-cutting capacities of one man up to 300%! Saves time, work, money! Leaves one hand free to feed or hold material.

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H. K. PORTER, inc.
Somerville 43, Mass.

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tribute to effective use of A-V equipment.

"Foundations for Effective Audio-Visual Projection" (S-3) is available at no cost from Sales Service Publications, Eastman Kodak Company, Rochester 4, New York.

A Modern Foundry

"FOUNDRY FLEXIBILITY," a motion picture about Link-Belt's new Ewart malleable iron foundry in Indianapolis, shows mechanical handling devices engineered for producing a wide variety of castings with frequent changes in production requirements.

Handling methods shown include complete molding lines for special

jobs in limited quantity, for small semi-continuous jobs, for continuous production jobs and for high production, high-speed automatic shell molding. The film also shows the many casting production steps and equipment.

"Foundry Flexibility" is in 16 mm, sound and color film, runs 29 minutes and is available for free showing to groups in the United States. Write to Link-Belt Company, Dept. PR, Prudential Plaza, Chicago 1, Ill.

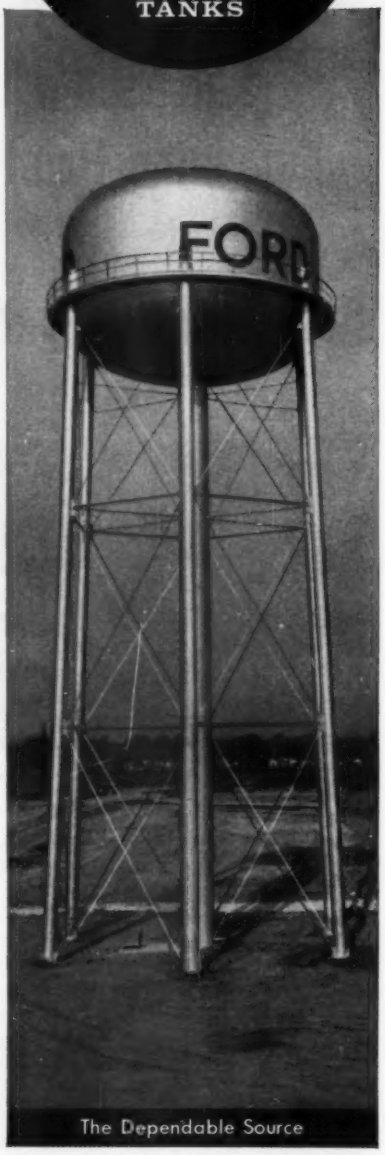
Film Facts on Insulation

THE DRAMA OF heat and its control through modern insulation is the subject of a new 26-minute, 16 mm color motion picture.

It explains and illustrates how to select insulation of the proper economic thickness. It describes problems of heat transfer as well as solutions based on insulation research and points out the vital role of such research in developing new industrial needs.

Showings can be arranged through local Johns-Manville representatives or through the headquarters office at 22 E. 40th St., New York 16, N. Y.

INDUSTRIAL PLANTS RELY ON GRAVER ELEVATED WATER TANKS



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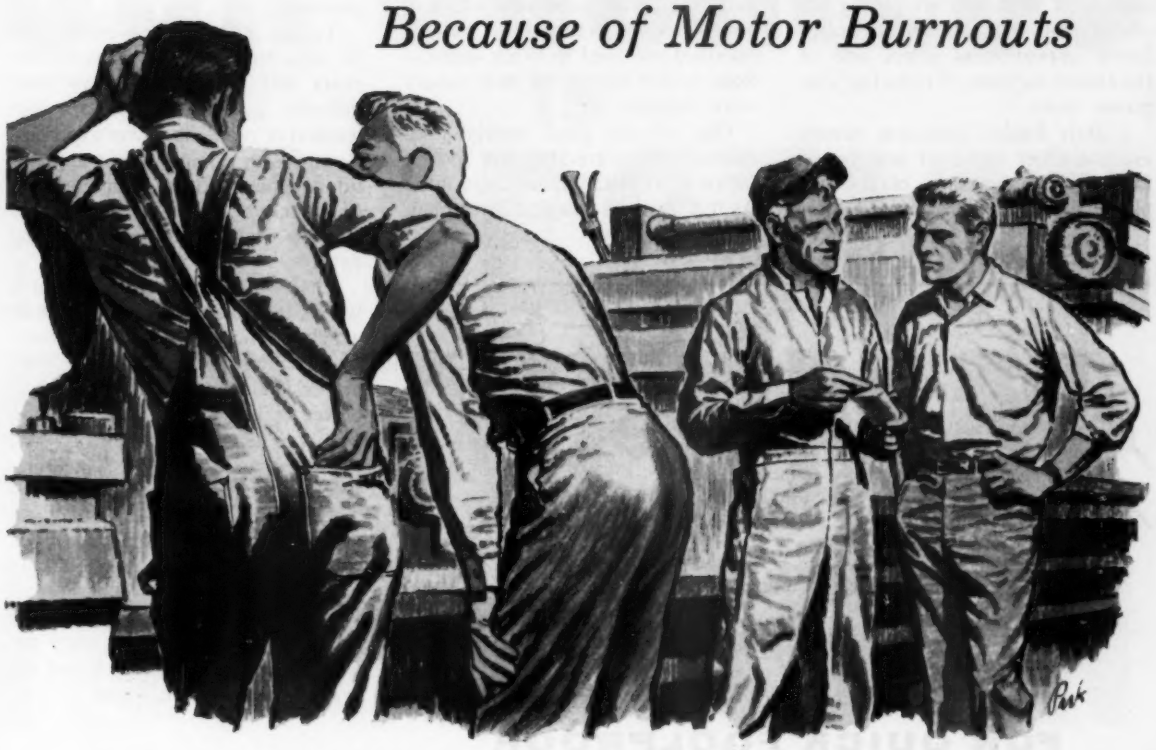
STOPPED

Because of Motor Burnouts

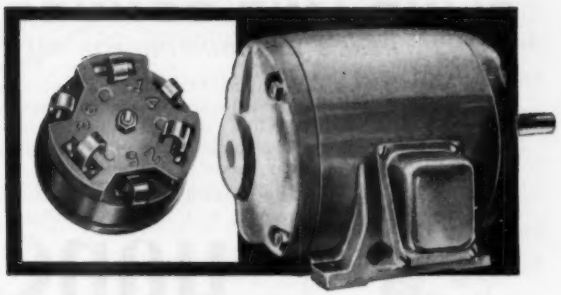


KLIXON

Built-in

PROTECTORS

Permit Maximum 3-Phase Motor Output...Eliminate Burnouts... Reduce Costly Down Time!



Motor burnouts are costly. They can and often do shut down not only single machines but an entire assembly line. You can guard against motor failures in your equipment by specifying and using 3-phase motors equipped with KLIXON Inherent Motor Protectors.

Built in by the motor manufacturer, KLIXON Protectors safeguard your motors and prevent overheating and motor burnouts caused by the following conditions —

Prolonged overloads, unbalanced voltage, stalling, failure to start, increased ambient temperatures, lack of ventilation, plugging or reversing duty, and single phasing.

The advantages to you are safe maximum motor output under normal and adverse operating conditions . . . simplified motor controls . . . reduced motor repairs and replacement . . . reduced costly production down time due to motor burnouts.

Be sure you get everything you expect from motor protection — specify KLIXON protection when you order motors. For full information, check with your motor supplier's district office, or write us for a copy of our new Bulletin PR-1243 on KLIXON three-phase motor protection.

METALS & CONTROLS CORPORATION

Spencer Division

4503 Forest Street, Attleboro, Mass.

KLIXON®

For more facts circle 639 on Reply Card

How To Cut Your Power Bill

(Continued from page 115)

up on your bill independent of the amount of work you are getting out of the plant. For this reason, power factor improvement offers one of the easiest methods of reducing your power costs.

Lightly loaded induction motors are the chief cause of low power factor in the average plant. One plant improved its power factor from 0.65 to 0.85 over a period of several years by simply making its motors work harder. This is done by checking each motor to determine the actual load and installing a motor closer to this value. Motors removed are used in other applications so that only a few new motors were required.

One of the most widely used methods of correcting low power factor is to install shunt capacitors. As this involves a capital investment running from $10 to $20 per kva, a study of penalties incurred and costs to reduce this expense is necessary to justify power factor improvement.

Typical return on invested capital runs from eight months to two years and you should have little difficulty gaining approval for this method of reducing power expenses. Your power company and application engineers from manufacturers of capacitor equipment will be very glad to work with you on solving any power factor problem.

The above suggestions are but a few of the many plans and methods which can help you use your power more efficiently and reduce your power bill. The more electrical power being used, the more it can be wasted unless controls are tightened up by plant engineering. While it is true that the plant engineer is not responsible for the use of power, he is responsible to see that those who are using it fully understand all the possible ways it may be wasted. He should take action where needed, to keep the waste of electrical demand and energy at a minimum. **End**

FOR QUICK FOOLPROOF FLUID LINE CONNECTIONS

HERE'S THE COUPLING FOR THE JOB

To connect a Hansen Two-Way Shut-Off Coupling, you merely pull back the sleeve and push the Plug into the Socket. To disconnect, just pull back the sleeve. No tools required. When Coupling is disconnected, similar valves in Socket and Plug shut off both ends of line – practically eliminate spilling of liquid or escape of gas at instant of disconnection.

Hansen Series HK Two-Way Shut-Off Couplings are available with female pipe thread connections from ⅛" to 1" inclusive. Available in brass or steel.

WRITE FOR THE HANSEN CATALOG

Here's an always ready reference when you want information on couplings in a hurry. Lists complete range of sizes and types of Hansen Quick-Connective Couplings. Write for your copy.

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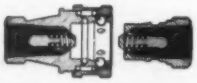
SERIES HK®

TWO-WAY SHUT-OFF COUPLING

Instantly shuts off both sides of line . . . prevents loss of liquid, gas, or pressure.



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THE HANSEN MANUFACTURING COMPANY

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For more facts circle 640 on Reply Card

Machine Tools "Off the Shelf"

(Continued from page 120)

sider a built-up tool for a production run of less than 20,000 parts produced over a two-year period.

When the planned production run of a specific part has been completed, the built-up tool is disassembled and the standard machine units are returned to the shelf for future use. Very specialized tool bases may be discarded, but standard bases are held for possible re-use.

Setting up such a program does not require a great outlay of money. Standard machine units can be purchased as needed, so the shelf stock of such units is cumulative as they are temporarily retired from service.

Despite the intangible nature of this program and the difficulty of establishing definite rules and costs, we are certain of one thing . . . It's saving us time and money, and aiding in maintaining consistent product quality—the fundamental reasons for its inauguration. **End.**

OUR BUSINESS IS PROTECTION FOR THERMAL INSULATION

Foster's entire operating organization including research, technical, production, sales and management are engaged in one endeavor only . . . keeping your thermal insulation protected from fire, weather, chemical and physical abuse as well as other forces that can hinder insulation efficiency.

Foster products for thermal insulation protection are backed by fifty years' experience in compounding products for heavy-duty protective use.

Every thought at Foster, every new Foster product, is aimed directly at prolonging the life of your heated and refrigerated insulations. And, therefore, practically every insulation-protection problem you may have—now or in the future—can be answered by some standard Foster protective system.

Consult Foster and use the finest products known for thermal insulation protection. Save . . . many times over . . . the wasteful cost of frequent repair and replacement. For literature relating to your needs . . . see your Foster Sales Engineer or outline your insulation protection problem in a letter or a phone call.

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Unlike any other flexible air duct, Wiremold Air Duct is made with a *flat* metal spiral that *mechanically locks* to the fabric component. Here's what this construction means to you:

- With Wiremold you get a *mechanically locked* seam the same as you insist upon with sheet metal duct. There are no glues or adhesives that may dry out and fail with age.
- Wiremold's exclusive *flat* metal spiral assures accurate size — and snug connections.
- Cuffed ends (and cuffing equipment) are never needed.
- Unlike ducts with cuffed ends, Wiremold's fabric and metal are *both* secured to end fittings, making stronger connections.
- Two lengths of Wiremold can be joined simply by screwing them together. No collars or clamps are needed.

FOR AIR CONDITIONING • EXHAUSTING
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WIREMOLD® AIR DUCT

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THE WIREMOLD COMPANY • HARTFORD 10, CONN.
For more facts circle 642 on Reply Card

New Plant Construction

(Continued from page 142)

tories, power plant and supporting facilities also are scheduled to get under way this year. Cost of the new construction is expected to reach approximately $10 million.

Nashville, Tenn.—General Shoe Corporation, 111 Seventh Ave., plans to construct a $15-million office and plant complex, starting this year, and spreading over the next six years, adjacent to the Nashville, Tenn., Municipal Airport. Expansion program calls for construction of three shoe manufacturing plants, a distribution center and an office building.

Marshall, Texas—Atlas Powder Co., New Murphy Rd., Wilmington, Del., plans to construct a new laboratory for expanded research on activated carbons at the site of its Darco Experimental Laboratory, located here. Work is already under way on the new facility which will cost a reported $500,000 when completed by August of this year. Yates Construction Co. is general contractor of the new project.

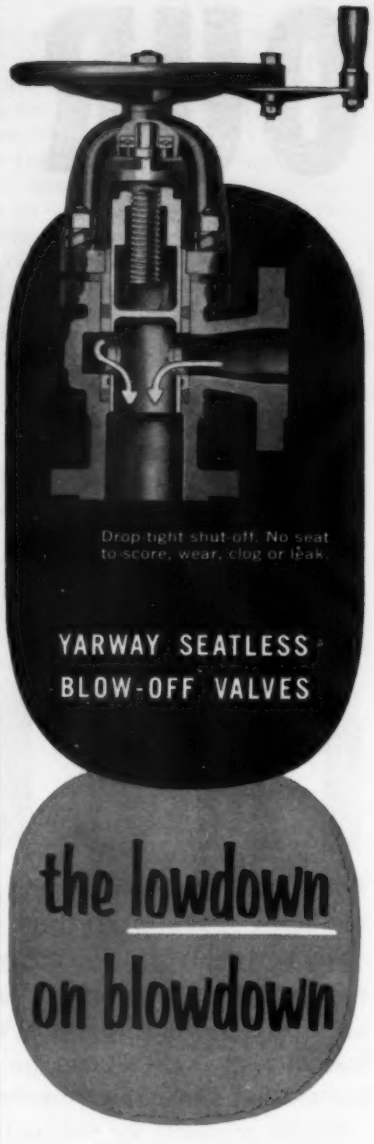
Orange, Texas—E. I. du Pont de Nemours & Co., Inc., Film Department, will begin construction soon on a new facility for the production of linear polyethylene with a low pressure process at company's Sabine River Works, located here. New unit will be completed by mid-1960.

Tyler, Texas—Continental Can Co., Inc., 100 E. 42nd St., New York, N.Y., plans to construct a new plant for the manufacture of corrugated boxes. Earth work, including filling, excavation and leveling is already under way and work on new facility will begin soon.

Salt Lake City, Utah—Flintkote Company, 4126 RCA Building, New York, N. Y., plans to construct a plant here for the production of company product used in the building construction field. New plant will be built under supervision of the Flintkote United States Lime Products Division and will cost an estimated $1 million.

Seattle, Wash.—Boeing Airplane Co., 7755 E. Marginal Way, is constructing a new brazing facility at local plant. New building will have a floor area of approximately 25,000 sq ft. Structure with equipment will cost about $1 million when completed late in 1960. Austin Co., 16112 Euclid Ave., Cleveland, O., is the consulting engineer of the project.

Nitro, W. Va.—Monsanto Chemical Co., 1700 S. Second St., St. Louis, Mo., has begun construction here on new plant for the manufacture of Mersize. New facility will utilize tall oil resins obtained from a fractionating plant for crude tall oil which was completed and placed in operation here in the summer of 1958.



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Call your Chromalox Man for answers to . . .

Trubek Laboratories, Inc., New Jersey. Photo by Chemical Processing.

When temperature requirements could no longer be met by a hot tempering oil central system, Chromalox "job-side" heating provided the answer.

Widely different temperature requirements on various processing vessels

Recently, this New Jersey company converted an old hot oil central system to Chromalox electric "job-side" heating. In addition to being troublesome, the old system could not provide the variety of temperatures required for their growing diversity of products. Switching to Chromalox Immersion Heaters, they now use Aroclors and Dowtherm as heat transfer media. On one 350-gallon vacuum still, 18kw of heat capacity now provides temperatures of 290°C. Chromalox Type TMO Immersion Heaters operate in the bottom of the vented vessel jacket which contains the heat transfer medium. Using 30kw, a 450-gallon sealed jacket reactor can attain 325°C, using Dowtherm-A.

Since some vessels had previously been equipped with steam coils or were glass-lined, insertion of heaters into the vessel or jacket was impractical. Instead, transfer media is heated adjacent to the vessel and circulated by sump-type centrifugal pump.

Perhaps your Chromalox Man, listed at the right, can help you solve some of *your* heating problems the easy, economical, *electrical* way. Why not give him a call for . . . *Faster heating* of water, oils, Dowtherm, Prestone. *Faster melting* of grease, asphalt, solder, babbitt. *Faster superheating* of steam, compressed air. 7784

CHROMALOX has a complete line of electric heaters to meet all your liquid processing requirements:

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BULLETINS

(Begins on page 23)

PAINTS, COATINGS

144 Spray Painting Equipment—This 30-pp catalog features the latest spray painting equipment for production and maintenance painting. Describes cup guns, Redi-Sprays (for spraying multi-color paints, enamels, etc. direct from original shipping pails), direct supply spray units, circulating paint systems and the Hydra-Spray for spraying paints without atomizing air. Gray Co., Inc.

145 For Spray Coating—Described in this bulletin is an airless spray coating system designed to save on material, compressed air and on labor requirements, and enable better working conditions, and reduced booth maintenance. Tells how system functions, discusses basic components. Nordson Corp.

146 On Protective Coatings—Revised Bulletin 100 gives general data on corrosion resistant coatings. Provides breakdown of four classifications of corrosive conditions according to severity of exposure. A chart enables selection of coatings according to service requirements, with physical properties and chemical resistance shown. Carboline Co.

147 Rust Index—This rust index of the United States lists rates at which metal rusts for each of 523 cities throughout the country, A color-coded map of the United States is included, as well as a statistical study based on weather, rainfall, humidity, salt water and salt air where found, sunlight and other natural and topographical factors, plus effects of industrial atmospheres —including corrosive gases and fumes. The Rust-Oleum Corp.

ELECTRICAL

148 Single-Phase Motors—Bulletin 470-B describes integral horsepower single-phase motors, ratings from ¾ to 20 hp, in open protected, totally enclosed fan-cooled and explosion proof. Bulletin outlines company's "weatherizing" treatment which makes motors suitable for use in damp, dirty or corrosive atmospheres. Tabulated ratings, dimensions, weights included. Motor Div., Robbins & Myers, Inc.

149 Transformer Guide—Complete engineering information on manufacturer's line of dry and liquid-filled transformers is presented in this looseleaf ring-bound catalog. Fully illusrated, provides details of construction, performance and dimensional data. Also discusses care and maintenance of dry-type and oil-immersed transformers. Marcus Transformer Co., Inc.

150 Distribution Regulator—Ratings, dimensions, capabilities of a three-phase distribution regulator (Type SFR,), along with description of optional equipment, are provided in 6-pp Bulletin 21B9026. The regulator offers savings in size, weight and cost, and comes in several self-cooled and air-cooled ratings. Allis-Chalmers Mfg. Co.

151 High Voltage Control—This 16-pp booklet discusses general features of company's high voltage control equipment. Details individual characteristics of both full and reduced voltage types of high voltage control for squirrel cage, synchronous and wound rotor motors. Ratings, dimensions, optional features listed. Cutler-Hammer Inc.

152 On Motor Controls—Profusely illustrated with product pictures and containing wiring diagrams and dimensional drawings and prices, 80-pp Catalog 14 gives complete size, weight and ratings information. An index lists catalog numbers and type identifications to facilitate finding information on particular equipment. One section lists replacement parts available and another contains heater tables and motor charts. The Arrow-Hart & Hegeman Electric Co.

153 Six Ideas on Switches—Vol. 1, No. 26 of Micro Tips contains ideas submitted by plant engineers and others showing how they've used snap-action switches to increase production efficiency. Shows six methods which can save man-hours, protect operators and machinery, eliminate waste. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

154 Trolley Busway System—Bulletin 75 contains 44 pp of information on company's 100 amp steel-enclosed trolley busway industrial electrification system. Illustrates and describes the track, trolleys and accessories used in the safe electrification of cranes and hoists, assembly and production lines, moving test lines, portable and machine tools, and other moving equipment. Special sections cover installation planning and procedure, methods of mounting and typical installations. Feedrail Corp.

155 Aluminum Rigid Conduit—Data on rigid conduit couplings and 90-deg aluminum conduit elbows is presented in this 6-pp booklet. Diameter and length dimensions, weights and packaging details are given for all standard trade sizes. Details advantages of aluminum conduit and lists typical applications. Kaiser Aluminum & Chemical Sales, Inc.

156 Electrical Connections—Form 2381 is a 24-pp guide to company's electrical connecting devices, including those in the Turnlok line (designed to provide positive contact regardless of vibration, yet be disconnected by a turn of the cap) and polarized line for locations requiring polarized connections. Fully illustrated, catalog gives features, sizes, ratings, other necessary selection data. Pass & Seymour, Inc.

LIGHTING EQUIPMENT

158 Floodlight Data—Floodlight Catalog 320 contains 184 pp of comprehensive design and selection data on floodlights, searchlights and special lighting equipment. In 14 sections, includes divider sheets, with individual table of contents for each. Section headings include selection of floodlights, heavy duty floodlights, general purpose floodlights, mercury vapor floodlights, special lighting fixtures, hazardous area lighting, searchlights, under-water floodlights, floodlight poles, accessories, installation suggestions, calculations. Book is available to qualified plant engineers, please state your job title when requesting it. Crouse-Hinds Co.

159 Vaportight Fixtures—Catalog Section F, 12 pp, on vaportight lighting fixtures, includes specifications, dimensional data with outline drawings and application information for components and assemblies of interchangeable pendant, ceiling and wall fixtures. Large cutaway photos show details. Stonco Electric Products Co.

CONSTRUCTION

160 Building Products—Featured in this 12-pp booklet are industrial building products, including three types of ribbed siding, V-beam roofing and siding, corrugated roofing and siding, flashing and accessories. Discusses design considerations and includes weight and coverage data, dimensional diagrams, and suggested specifications. Kaiser Aluminum & Chemical Sales, Inc.

161 Tubular Building Frames—Described in 6-pp Bulletin 5M are advantages of company's line of tubular building frames which require no welding, cutting, riveting or bolting at building site. Design and construction details are illustrated. Swiss Fabricating, Inc.

162 Floor, Roof System—Described in this 8-pp 1959 catalog (Form L1) is manufacturer's precast concrete floor and roof system. Includes photos, design data and detail drawings on the use of Flexicore with steel and reinforced concrete frames, plumbing, heating and cooling systems and electrical wiring. Also gives recommended specifications. The Flexicore Co., Inc.

163 Daylighting Products—Featured in 22-pp Bulletin 585 are corrugated roof skylighting, built-up roof skylighting, Consolite skylights, continuous sash and siding, monitor and masonry walls, insulated walls, monitor with ventilating units, reglazing and vents. Physical properties of Resolite are listed and characteristics described. Drawings and diagrams illustrate details and table gives specifications. Resolite Corp.

164 Translucent Panels—Sanpan translucent building panels, a structural sandwich of two skins of fiber glass-reinforced polyester plastic laminated to an extruded aluminum

BULLETINS

(Begins on page 23)

grid-work core, are described in this 8-pp bulletin. Gives advantages and provides data chart on available types. Suggested installation details are illustrated. Sanpan panels are for use in curtain walls, interior partitions, roof panels, skylights, dividers. Panel Structures, Inc.

165 Thermal Insulation—Characteristics and applications of diatomite mineral fillers are detailed in 12-pp Technical Bulletin E41. Includes descriptive material on uses of diatomite as loose fill insulation, as an ingredient of calcium silicate insulation and its application in other fabricated insulations, as well as uses in asphalt compositions and as admixtures. Mining & Mineral Products Div., Great Lakes Carbon Corp.

166 Scaffold Shoring—This instructional handbook covers use of steel panel scaffolding for shoring. Advantages are detailed and handbook sections on applications such as slabs with beams or dropheads, engineering data as well as case histories including actual shoring layouts given. Universal Mfg. Corp.

METALS, PRODUCTS

167 Ductile Irons—This 28-pp booklet contains the full story of NiResist ductile irons that combine strength and toughness with resistance to heat, wear and corrosion. Tables and graphs explain mechanical and physical properties, erosion and corrosion resistance, high temperature strength. Also presented are numerous industrial applications. The International Nickel Co., Inc.

168 Aluminum Forgings—This 36-pp booklet discusses equipment, products and services of company's plants which produce aluminum and magnesium forgings. Facilities needed to produce various forgings are described, ranging from a 50,000-ton hydraulic press to forging hammers, upsetters, a ring roller and die shop. Properties and kinds of aluminum forgings are listed, and typical examples pictured. Also included are charts of performance characteristics. Aluminum Co. of America.

169 Alloy Fabrication—Detailed information on how to fabricate Hastelloy alloys is presented in 36-pp Booklet F-30. Step-by-step procedures and recommendations for welding forging, machining, grinding, brazing, heat-treating, and descaling and pickling are included, as well as information on lining of vessels and corrosion surfacing, along with boiler code data. Haynes Stellite Co., Div. Union Carbide Corp.

170 Aluminum Mill Products—General information, description of characteristics and typical properties of company's mill products, including sheet, plate, foil, rod, bar, wire, extrusions, tubing, forgings, billet and pig are presented in this 24-pp bulletion. Data is tabulated for easier reference and comparison. Diagrams, photos and drawings are included, as well as tables on heat treatable and non-heat treatable alloys. Kaiser Aluminum & Chemical Sales, Inc.

171 Which Wire Cloth?—This 16-pp booklet covers use of Inco nickel alloy wire cloth for filters, core-support structures and other applications. Describes physical advantages of wire cloth and indicates range of weaves and sizes available. Mechanical properties of four standard alloys used are given, along with list of products commonly filtered with such wire cloth. Case histories detail use of Monel alloy wire cloth. The International Nickel Co., Inc.

INSTRUMENTS, CONTROLS

172 Electronic Instruments—Complete specifications of company's potentiometer and bridge instruments in indicating, recording, and controlling models are presented in 64-pp Bulletin P1245-A. Information on new rack mounting instruments, high-speed and multi-point instruments and miniature ones is included, also descriptions of standard round-chart and strip-chart instruments. A section is devoted to sensing elements. The Bristol Co.

173 Flow Rate Transmitter—Bulletin 170 contains 12 pp of design and operation information on company's line of rotameter flow rate transmitters. Cutaway diagrams illustrate component details. Performance data and capacities table are included. Brooks Rotameter Co.

174 Electronic Receiver—Eight-pp Bulletin OE-1003 lists specifications for the PowrLog H-O receiver as used in temperature, pH and conductivity measurement and a-c and d-c closed circuit telemetering. Contains 10 schematic drawings showing applications of the instrument, including those for d-c voltage and current measurement and a-c and d-c signal transmission and summation. Hagan Chemicals & Controls, Inc.

175 Plug Valve Actuator—This 22-pp brochure gives data on plug valve actuators designed for remote or automatic control operation of a wrench operated plug valve. Included are specifications, dimensions and torque information, as well as revised and expanded selection tables. Pantex Mfg. Corp.

176 Temperature Detection—How to obtain reliable, low-cost temperature detection using company's monitor system is described in 30-pp Publication 3036C. Details of operation, construction, specifications, connections, installation are included, as well as a table of temperature/resistance characteristics. Thomas A. Edison Industries, McGraw-Edison Co.

OTHER EQUIPMENT

178 Chain Link Fencing—A comprehensive review of aluminum's role in the growing fence market today is presented in this 12-pp booklet. Outlines details of typical installations of aluminum chain link fence. Complete technical data on strength, resistance to corrosion, and durability is presented. Tensile strengths, as well as suggested aluminum alloys, are included. A companion publication gives suggested specifications. Aluminum Co. of America.

179 Generators, Auxiliaries—Twenty-pp Catalog SB 60, on steam generators and allied equipment, provides cross section views of major products to show design and construction. Standard and special boilers are included, also burners, stokers. Erie City Iron Works.

180 Templet Guide—Listed and described in this 102-pp catalog are over 15,000 templets representing the most-used standard machine-tools and shop equipment items. Covers templets for machines, shop equipment, material handling equipment, lab equipment, office equipment, and architectural details and includes complete price and dimensional information. Catalog is available to qualified plant engineers, please state your job title when requesting it. Repro-Templets Inc.

181 Making Reservations?—For plant engineers whose jobs take them traveling, this 96-pp pocket-size booklet published by a leading hotel chain contains details on hotel facilities in most major cities in the United States and Canada. Covers everything from rates for personal accommodations to dining facilities and sizes of function rooms available for conferences, meetings. Includes information on reservation services. Sheraton Corp. of America.

183 Data On Plastics—This 64-pp catalog contains 12 individual sections on plastics, organized to highlight, up front, the commonly used types, with the less-frequently-used (but not less important) plastics grouped in the latter portion. Carries information on such products as Kel-F, Rexolite, and other of the newer plastics, as well as Plexiglas, vinyls, acetates, phenolic laminates, Nylon, Teflon, Polyethylene, Fiberglas, and coatings and accessories. Commercial Plastics & Supply Corp.

184 Industrial Fasteners—Eight-pp Form 2449 describes standard precision industrial fasteners—including socket screw products, pressure plugs, locknuts, spring pins, dowel pins and steel collars. Provides design and applications information as well as specifications, photos, drawings and cutaways. Standard Pressed Steel Co.

185 Automatic Air Filter—Twelve-pp Bulletin 248-C describes construction and operating characteristics of company's automatic renewable- media air filter. Operation and performance data are included, as well as sizes. American Air Filter Co., Inc.

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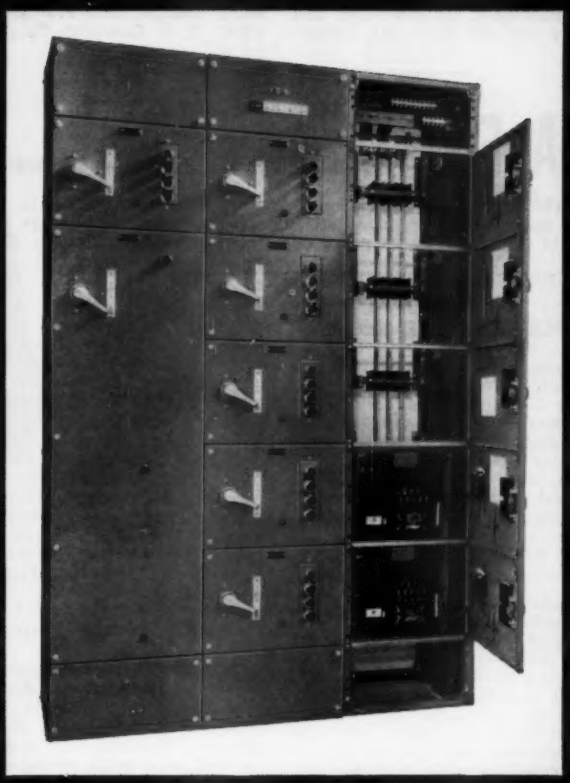

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186 **Magnetic Circuits**—A detailed discussion of magnetic circuits is featured in Vol. 6, No. 1 of Applied Magnetics. Presents a summary of permanent magnetic circuits especially suited for tractive applications which utilize the attractive, holding or repelling forces of permanent magnets. The Indiana Steel Products Co.

187 **Clarifiers, Thickeners**—Bulletin W-800-D contains 16 pp of detailed information on clarifiers and thickeners for use in water, industrial waste and sewage treatment. Design and operation information on clarifiers and thickeners is furnished, as well as specifications, dimensions, sectional diagrams, typical drive mechanisms. Infilco Inc.

189 **Cellular Materials**—This 8-pp bulletin illustrates and describes properties and applications of industrial cellular rubber and plastics. Covers sponge rubber, Neoprene, silicone, sponge, Cell-Tite and cellular vinyl. B. F. Goodrich Co.

DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided on pages 221 and 222.

TOOLS, MACHINE SHOP

301 **Industrial Tools**—Information on a complete line of industrial tools, including 500 new types and sizes never before offered, is presented in 120-pp Catalog 57. Included are complete lines of wrenches, socket wrenches, drop forged clamps, tool holders, set up and hold down tools, cutting tools and pipe tools. Photos, drawings and numerous charts aid selection. Armstrong Bros. Tool Co.

302 **Industrial Wrenches, Hand Tools**—Tools for production lines, maintenance work and product servicing are featured in a 156-pp Industrial Catalog 58-I. Loaded with pictures and tool facts, book describes in detail the complete line of over 4,000 tools—including chests and rollcabs, wrenches and sockets of all types, screwdrivers, pliers, pullers, etc. Snap-on Tools Corp.

303 **Pipe Tools**—Ordering and application information on Ridgid pipe tools is provided in 16-pp illustrated Catalog 7596R6. Wrenches, cutters, threaders, reamers, vises, and others are pictured and described, also power drives, oilers. The Ridge Tool Co.

304 **Portable Electric Tools**—Form 10 features a complete line of portable electric tools including drills, screw-drivers, impact wrenches, magnetic drill presses, sanders, grinders, hammers, holesaws, and forged tools. The Black & Decker Mfg. Co.

305 **Hydraulic Power Tools**—Bulletin A-5-58 covers independent pump hydraulic jacks, single and double plunger hand pumps and double acting air engine pumps. Advantages are detailed. H. K. Porter Co., Inc.

306 **Power Tools**—Industrial construction and other portable power tools for the manufacturing, construction, woodworking and metal-working industries are described in this 50-pp catalog. Tools appear in logical sequence of size and duty rating. Specification tables at bottom of each page permit easy selection. Skil Corp.

307 **Powder Actuated System**—Two booklets cover applications of a powder actuated fastening system. One booklet shows how it can be used for plant maintenance — fastening conduits, bus ducts, junction and outlet boxes, surface raceways, fixtures and frames, duct straps, fan and blower mounts, etc. The second booklet indicates the correct fastening and charge to use to fasten materials to concrete or steel. Ramset Div., Olin Mathieson Chemical Corp.

308 **Masonry Bits**—Catalog M B C-56 describes carbide-tipped masonry bits for drilling holes in tile, brick, concrete, granite or any other kind of masonry. Specifications are included, as well as a table giving chuck and shank requirements to adapt to different electric or pneumatic hammers. New England Carbide Tool Co., Inc.

310 **Data for the Shop**—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. Conversion tables, steel numbering systems, machinability ratings. Standard Oil Co. (Ind.)

SLINGS, CHAINS, WIRE ROPE

311 **Sling Handbook**—Form SL-3 is an illustrated 40-pp reference book covering more than 80 subjects on slings and fittings. Included in this revised edition is reference information condensed into handy chart form on sling types, dimensions and rated loads. Union Wire Rope Corp.

312 **Sling Chain Handbook**—Illustrated Data Book 100, 32 pp, presents "how to do it" information on sling chains—from ordering to care, use and inspection. Contains diagrams, charts and tables on standard and special styles of sling chains and attachments. Columbus McKinnon Chain Corp.

313 **Slings For Industry**—Bulletins 5886 and 5308-R describe Safe-Guard cable-laid slings, designed for applications where a soft sling body is required and where flexibility is more important than resistance to abrasion; and rope-laid slings for applications where abrasion resistance is a first consideration. Rated capacity tables included. Macwhyte Wire Rope Co.

314 **Self-Lubricating Chain**—Bulletin SLC-57 describes and illustrates exclusive, oil impregnated sintered bushing design feature of company's self-lubricating roller chain. Engineering data, dimensions and application reports. Whitney Chain Co.

CONSTRUCTION

315 **Structural Glass**—Catalog 59-1 contains essential data on company's line of rolled, figured and wired glass for a variety of industrial applications. Advantages and important functions are described, and light distribution tables and specifications are included. Mississippi Glass Co.

316 **Replacement Glazing**—Twelve-pp Booklet PL-251 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic, Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems, this practical booklet gives properties of this sheet. Plastic Dept., Rohm & Haas Co.

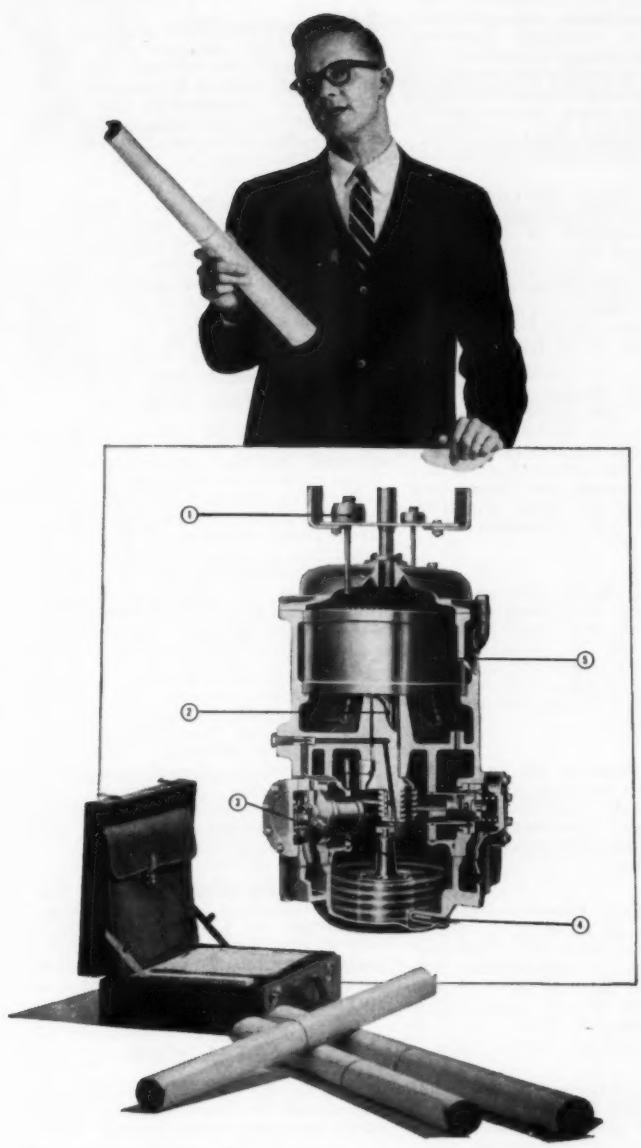
317 **Insulated Curtain Walls**—Technical Manual 2786 contains description, details and application methods of Gold Bond Asbestostone Panels. Includes specifications as well as photographs and dimensional drawings showing construction details. National Gypsum Co.

319 **Fire-Resistant Resin**—Structural panels, skylight louvers, chemical ductwork and other products made of Hetron, permanently flame-resistant polyester resin are covered in this illustrated bulletin. Table lists characteristics and suggested specifications. Durez Plastics Div., Hooker Electrochemical Co.

320 **Aluminum in Colors**—This bulletin introduces Alcoa's Alumalure colored aluminum architectural building sheet products, a complete line of sheet products offered in 11 colors. Five of the newly developed hues are pigmented aluminum to impart a soft, pleasing metallic appearance. Aluminum Co. of America.

321 **Steel Floor Plate**—**Skid** resistance and other advantages of USS multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, data on loads. United States Steel Corp.

322 **Non-Slip Flooring**—Algrip, an abrasive rolled steel floor plate described as non-slip even on steel in-



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DATA FILE

(Begins on page 226)

clines, is the subject of Booklet AL-29, 8 pp. Discusses safety features, fabricating. Alan Wood Steel Co.

323 **Foundation Pipe Piles**—Comprehensive information on Taylor Forge spiral-weld foundation pipe piles is presented in 24-pp Form F-5677. In addition to detailed specifications, the illustrated booklet describes a number of pipe-pile installations and includes driving logs. L. B. Foster Co.

324 **Flooring Materials** — Bulletin 658 describes a complete line of heavy-duty flooring materials designed to solve tough flooring problems. Text explains the use and application of heavy duty emery aggregates, bricks, bonds and cures and includes engineering data on each of these. Walter Maguire Co., Inc.

325 **Grating, Stair Treads**—Bulletin 1105, 16 pp, describes construction and design advantages of company's line of interlocked grating and stair treads. Contains detailed information, photos, drawings and engineering data on rectangular, diagonal, radial and serrated gratings, stair treads, armoring and flooring, and includes photos of typical installations. Dravo Corp.

326 **Steel Grating**—Featured in this 16-pp bulletin is company's line of steel grating and stair treads for a variety of industrial applications. Pictures of typical installations are included, also tables of engineering data. Kerrigan Iron Works, Inc.

327 **Watertight Concrete**—A summary of authoritative thought on design and specification of watertight concrete is given in 6-pp folder. Covers basic requirements and tells how Pozzolith rdeuces permeability, shrinkage, bleeding and segregation to produce strong, durable structural concrete. The Master Builders Co.

328 **Scaffolding System**—Featured in this booklet is Swiss-Lok a simplified system of scaffolding designed for rigidity, fast erection, easy handling nad storage, and heavy loading. Advantages are detailed and assembly illustrated. Swiss-Fabricating Inc.

SHELVING, SHOP EQUIPMENT

329 **Shop Equipment**—Work benches, tool stands, shelving and other pressed steel equipment for the shop, laboratory and assembly line are shown in 8-pp Form 2299. Construction features and specifications of size, top material, equipment variations. Standard Pressed Steel Co.

330 **Guide to Shelving**—To assist plant engineers in selecting proper shelving for all storage requirements, 64-pp Catalog 30 offers detailed suggestions for correct shelving and storing materials, loose and packed parts, record files. Shop equipment and storage cabinets are also described, and instructions included for planning of stockrooms. Deluxe Metal Furniture Co., Royal Metal Mfg. Co.

MATERIALS HANDLING

331 **For Overhead Handling**—Booklet 2008-M, 12 pp, is repleted with illustrative material on principal component of overhead handling systems. Track design and advantages of supporting it flexibly are described, and formulas and figures for comparing various track systems given. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

332 **High Speed Hoist** — Bulletin 145, 12 pp, describes design and construction advantages of company's heavy duty high speed hoist for a variety of industrial applications. Specifications are included, as well as capacity tables, dimensional diagrams. Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.

333 **Electric Hoists**—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conducting systems. Clearance data included. Wright Hoist Div., American Chain & Cable Co., Inc.

334 **Electric Hoists**—Six-pp illustrated Bulletin 905 describes R&M Type J electric wire rope hoists in capacities of ¼, ½, 1 and 2 tons. Shows complete specifications including mounting options and sectional drawing. Hoist & Crane Div., Robbins & Myers, Inc.

335 **Power-Rotated Jib Crane**—Illustrated and described in this pamphlet are features and advantages of company's power-operated jib crane. Specification data are included. R. G. LeTourneau Inc.

336 **Push-Type Cranes** — Featured in 8-pp Bulletin PT-1253 are push-type cranes for loads not exceeding 4000 lb. Tables of dimensional data are included, as well as diagrams and photos of typical installations. Industrial Crane & Hoist, Ingersoll Products Div., Borg-Warner Corp.

337 **Overhead Conveyors**—Essential information and profit-making ideas are contained in this one-volume library on overhead conveyors. Collected in a single folder are engineering data, field reports on use of overhead conveyor systems, product bulletins, material on features, tips on maintenance. Pictures, charts, drawings and diagrams are also included. Available to qualified plant engineers. Rapistan-Keystone, Inc.

339 **Steel Conveyor Belts**—"A profitable approach to the selection of the subject of this 16-pp bulletin. Simplified selection, standard specifications, and installation information. The Colorado Fuel and Iron Corp.

341 **Materials Handling Hose**—Presented in this illustrated bulletin is a line of materials handling hose for industrial applications. These include use in sand blasting, for steel shot blasting, for industrial vacuum cleaners, and for blowing rock wool and other insulation material into walls. The Goodyear Tire & Rubber Co.

342 **Boxes and Trays**—Contained in this folder are separate data sheets on company's line of boxes and trays for moving, storing and drying. Advantages of construction and design are illustrated, and dimensional data and specifications included. Molded Fiber Glass Tray Co.

343 **Adjustable Ramps** — Engineering details and other information on use and installation of company's hydraulic adjustable ramps for loading docks are featured in this illustrated bulletin. Two types of dock equipment are treated — the Adjust-A-Dock, installed in the loading platform or at its level, and the Adjust-A-Truck, installed at ground level. Rowe Methods, Inc.

344 **Casters, Wheels**—This 192-pp manual, Number 60, contains detailed information on a line of casters and wheels designed for a variety of furniture and equipment applications. Dimensional data, specifications and price lists are provided for furniture and industrial casters and wheels, and photos, drawings and diagrams illustrating design and construction features are included. Darnell Corp.

345 **Casters and Wheels** — Twenty-pp Condensed Catalog 157-G covers many styles of casters, wheels and glides. Listings cover products for industrial, institutional, office and other applications. Installation guides, selection tables, descriptions and specifications for a full range of casters and wheels are included. The Faultless Caster Corp.

346 **Self-Dumping Hopper** — Described in Bullein 260 is a self-dumping hopper for low-cost handling of wet or dry, hot or cold, bulk materials. A variety of standard models are pictured and described and data furnished. Roura Iron Works, Inc.

METAL HOSE

347 **Flexible Metal Hose**—Detailed instructions on how to install all types of flexible metal hose properly, in order to secure the longest service are given in Bulletin N14A. Eight diagrams explain correct use of flexible connections to compensate for misalignment, and to eliminate vibration transmission. The Korfund Co., Inc.

348 **Flexible Metal Hose**—Contained in this 36-pp bulletin is detailed information on characteristics and applications of company's flexible metal hose designed to serve a variety of industrial needs. Includes specifi-

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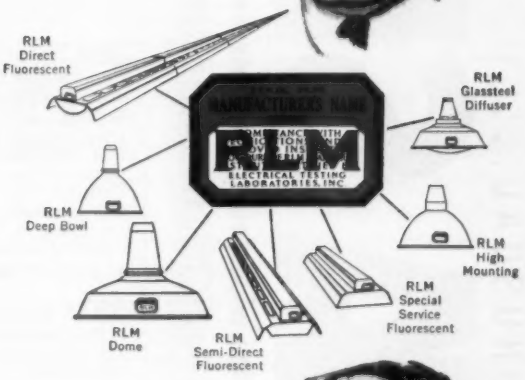
Q *Why do the new, higher, lighting levels now recommended by the Illuminating Engineering Society make the* **RLM LABEL** *More Important than ever?*

A *You can't have Quality Lighting without* **QUALITY LIGHTING FIXTURES.**

Higher Lighting levels put more importance on conformance to highest RLM concepts of lighting fixture design, construction, performance and maintenance features.

Q *What is meant by... "Only the RLM Label provides this essential warranty of* **UNIFORM QUALITY..."?**

A *It takes over* **1000 WORDS** *to cover the RLM specifications* for each type of fixture. Further, it requires the services of the Electrical Testing Laboratories of New York (an independent engineering organization) to insure uniform and consistent conformance by making periodic tests from samples secured both from the production lines and the field stocks of every participating manufacturer. The simple passing of the tests by the submission of a sample or samples is not enough. To be entitled to the RLM Label, fixtures are subject to continuous examination and must uniformly meet the RLM quality Spec's so as to insure unvarying quality from fixture to fixture.



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☐ **Please send the FREE RLM Specifications Book containing latest Specifications and 10 pages of facts about the RLM Label. Also, a complimentary copy of the New Higher I.E.S. Industrial Lighting Recommendations.**

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Company.....

Address.....

City..... Zone..... State.....

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Technical information on request — write DURAMETALLIC CORP., Kalamazoo, Michigan

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DATA FILE

(Begins on page 226)

cations, list of applications, and photos of the various types of hose available. Typical installations pictured. Pennsylvania Flexible Metallic Tubing Co., Inc.

ELECTRICAL

349 Fan-Cooled Motor — Illustrations and description of company's totally enclosed fan-cooled electric motors are featured in Bulletin 827. Cutaway views show features. Brook Motor Corp.

350 Trolley Busway System—Three bulletins offer help on electrical installations involving cranes and hoists, assembly and production lines, test lines and other moving electrical equipment. Bulletin 60, 40 pp, covers 60 amp systems; Bulletin 70, 32 pp, covers 225-500 amp systems; Bulletin 75, 44 p, covers 100 amp systems. Each includes special section on installation planning and procedure, mounting, and illustrations of equipment. Feedrail Corp.

351 Flexible Electric Conduit—Performance and application data on company's line of flexible plastic covered electrical conduit, liquatite, are featured in this illustrated brochure. Specifications and ordering data. Electri-Flex Co.

352 Metal Raceways — Pocket-Size Catalog and Wiring Guide 21, 144 pp, covers surface metal raceways and fittings, multi-outlet systems, fluorescent and slimline lighting equipment, and non-metallic flexible conduit, with detailed installation instructions. Catalog lists fittings, covers fastening methods, wiring for spotlights, graphical electrical symbols, and provides illustrations of various types of installations. The Wiremold Co.

353 Mineral Insulated Cable—Properties and applications of mineral insulated cable are described in this 12-pp bulletin. Method of fabrication is detailed, as well as installation procedure, construction and performance characteristics, and dimensional data is included. General Cable Corp.

354 For High Voltage Cable—Test results and service records on an improved butyl rubber compound for high-voltage cables are announced in 12-pp Bulletin EB-27. Covers resistance to ozone, operating temperature, high-voltage, dielectric strength, aging, insulating resistance, absorption. Anaconda Wire & Cable Co.

355 Insulated Cable — "How to choose insulated cable" is the subject of humorously illustrated 22-pp Bulletin 1117. Basic considerations to keep in mind when selecting insulated cable are stressed, and essential facts about construction components are presented in easy-to-follow form. The Okonite Co.

ADAMS FACT FILE #2

PLANT AIR

Moisture Chief Cause of Trouble . . .

Every company today is looking for ways to offset the increased costs of labor, material, equipment and services. At a gasoline station you expect "Free Air", but in industry it is a major expense. Perhaps in your own plant, for an investment in a few minor compressed air system alterations, significant savings are possible.

Water, sludge, rust, oil and dirt in compressed air systems are prime causes of maintenance and production down-time. Water vapor condensing in air lines tends to corrode the piping. Also, water present in the piping may freeze during winter, causing serious reduction of compressed air supply. Such restrictions are often difficult to locate and thaw. This same line moisture may emulsify lube oil destroying its lubricating value and the resultant mixture has high fouling characteristics. Frequently, ice will form within the tool itself since expanding air cools the moisture . . . tool efficiency will be seriously affected.

Some of the Other Problems Created By Wet Compressed Air . . .

Wet compressed air is not only a construction and production tool problem. Faulty paint jobs, contaminated chemical and food products can often be traced to moisture laden compressed air. Waterhammer, unequal pipeline thermal expansion and line leaks also result from collected moisture. In addition, air lost through traps, and in blow-down of compressed air lines provide no useful work . . . represent a sizeable power loss.

You Can Lick Compressed Air Moisture Problem . . .

All of these hidden costs can be virtually eliminated by the installation of an Adams Aftercooler and Cyclone Separator between the compressor and receiver tank. By cooling discharge air to within 10° F. of cooling water temperature — guaranteed with Adams standard Aftercoolers — the moisture can be removed at the separator. Pressure loss is less than one-half pound on these units including the separator. In severe cases, moisture removal of over 90 per cent can be obtained by cooling the air with Adams 2° Aftercooler to within 2° F. of water temperature.

Air Filter for Final Protection at Point of Use . . .

As an added safeguard for expensive tools and equipment, an Adams Poro-Stone Air Filter should be installed just before the air is used. These filters remove all solid material picked up by the air stream. With an Adams Aftercooler, Cyclone Separator and Air Filters clean, dry, trouble-free air is supplied to your production tools. You get continuous service with minimum maintenance.

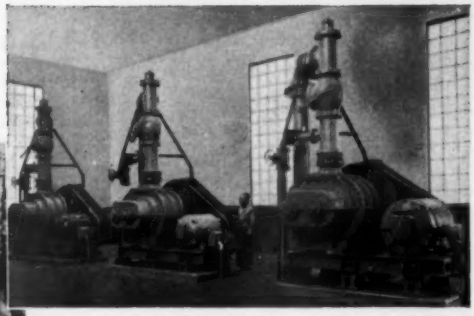
For further information on how the complete line of Adams air equipment can solve your compressed air problems, write today for your free copy of Bulletin No. 712 on Aftercoolers and Bulletin No. 117 on Poro-Stone Air Filters from the R. P. Adams Company, Inc., 254 East Park Drive, Buffalo 17, New York.

For more facts circle 650 on Reply Card

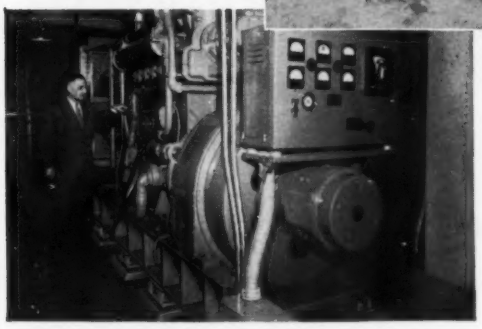
RESILIENT MOUNTING

CUTS FOUNDATION COSTS IN HEAVY MACHINERY INSTALLATIONS

RESILIENT MOUNTING of this 400-ton capacity Clearing press at the RCA-Whirlpool-Seeger Plant in St. Paul, Minn., directly on Korfund Vibro-Isolators effected dramatic savings in eliminating special foundations and reinforcement. Isolators protect the structure, nearby equipment, personnel, and the press itself from shock and vibration. View at right shows mounts being installed below floor level. →



RESILIENT MOUNTING of these 3 Sutorbilt Blowers at the City of San Jose, California, Sewage Treatment Plant on Korfund Vibro-Isolators cut foundation costs and provided trouble-free, *complaint-free* operation, even though the plant is located in a residential area.



RESILIENT MOUNTING of this 300-hp Fairbanks-Morse Diesel-Electric Generator at General Telephone Co. of Los Angeles on Korfund LK/E Vibro-Isolators completely eliminated the need for a foundation, yet protects delicate switching and electronic apparatus from malfunction and damage due to vibration.

RESILIENT MOUNTING, soft, but elastic, is safe and practical. Korfund steel spring mounts prevent transmission of vibratory forces and change harmful sudden shock loads to harmless gradually applied forces. Foundation costs are cut! It is no longer necessary to add the usual 100%, or higher, safety factor for dynamic forces—required with rigid mounting methods—when figuring structural and soil loads, if Korfund resilient mountings are used. Korfund Vibro-Isolators absorb these dynamic forces and protect the structure and the machine itself from damage due to vibration and shock.

Next time you run into a problem of this kind, it will pay you to get in touch with Korfund first. Many case histories with complete specifications are available. Chances are, Korfund engineers have solved a problem just like yours in the past. Meanwhile, write today for your copy of Bulletin 61 which gives full details.

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A *modern* approach to apparatus maintenance that can help lower your costs, reduce downtime, achieve more economical production line operation. A-c motor repair in 12 hours, in-plant maintenance consultations, high quality materials, experienced workmanship . . . you get all this, and many other benefits *at no additional cost.* Clip the coupon below and send it in today for more information on what General Electric's Service Shops can do for you.

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GENERAL ELECTRIC

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DATA FILE

(Begins on page 226)

356 On Cable Installation—Bulletin RCT-101, 20 pp, contains suggestions, precautions and accepted practices for conduit, duct and direct burial installations. Types of installation are described, and sections covering splicing instructions, materials for cable terminations, installation and maintenance proof testing are included, and detailed diagrams and data. Rome Cable Corp.

357 Small Motor Switches — Detailed selection data on company's line of small motor switches are presented in this 14-pp Bulletin EA-114. Diagrams illustrate mounting details and tables list essential data. Cutler-Hammer, Inc.

358 Enclosed Switches—Catalog 83, 20 pp, Catalog 84, 16 pp, and Catalog 101, 24 pp, describe enclosed switches for industrial uses. Included are general switches designed for use on either a-c or d-c applications, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

359 Circuit Breakers — Bulletin 5042-A deals with company's current lmiiting circuit breakers on low voltage systems, operational characteristic curves and ratings. A three-dimensional sectional view opens up to show internal construction details. I-T-E Circuit Breaker Co.

360 Control Switchboards — Relay and control switchboards are the subject of this illustrated 22-pp bulletin. Various components of the equipment are described, and typical specifications, line diagrams, and other engineering details included. Northeastern Engineering, Inc.

361 Motor Protectors — Questions and answers about company's built-in, three-phase motor protectors are designed to describe features and advantages of these control units. Typical applications are illustrated. Metals & Controls Corp.

362 Distribution Equipment — Detailed information on company's line of electrical distribution equipment is presented in this 82-pp '58 Marketeer, Catalog M-158. Among equipment described are Electrostrip multi-outlet assemblies, switches, lighting panelboards, power panelboards, switchgear assemblies, and various types of electrical duct. Tables of essential data. BullDog Electric Products Co., Div. I-T-E Circuit Breaker Co.

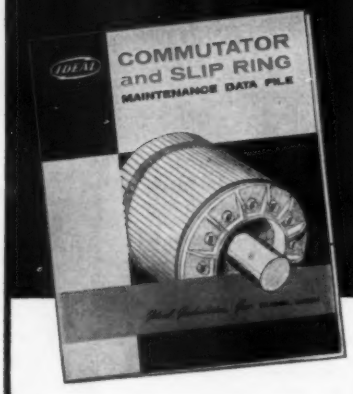
363 Portable Distribution System—Described in this 30-pp catalog is a portable distribution system for electric lighting and power, including such applications as portable lighting, heating and ventilation equipment, welding machines, power tools, and lighting transformers. System

FREE

NEW SERIES

HOW-TO-DO-IT ARTICLES

on Commutator and Slip Ring Maintenance



Years of experience are packed into this new 6-article series — each an invaluable guide for keeping commutators and slip rings at peak performance.

Each article discusses a major part of the overall problem — gives practical tips on maintenance — tells how to solve common problems — what to do and how to do it — in easily read shop language. Supplied in attractive folder, forming complete maintenance data file.

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diagrams showing how each unit fits are included. Whitney Blake Co.

364 **Protective Equipment Guide**—Form SPD is a 24-pp handbook on selection of protective devices for electric circuits, motors, appliances and apparatus, and is based on 1956 National Electrical Code. Besides providing suggestions on how to select right kind of protection, booklet provides wiring diagrams, motor tables. Bussmann Mfg. Co.

365 **Electrical Equipment Digest**—Electrical equipment illustrated and described in 160-pp Catalog Digest 142, includes load centers, circuit breakers, low voltage control, fusible service equipment and accessories, meter sockets and troughs, safety switches, panelboards, duct and fittings, starters. Square D Co.

366 **Electrical Equipment** — Condensed Catalog No. 5 contains 48 pp of descriptive data on company's line of electrical products, including conduit bodies, conduit fittings, connectors, ground fittings and EMT fittings. Dimensional data and features are shown. Gedney Electric Co.

367 **Commutator Maintenance**—This commutator and slip ring maintenance data file contains information on methods and procedures for more efficient commutation. Individual bulletins cover brushes, sparking, picking, dragging and other troubles, maintenance tools and how to use them. Ideal Industries, Inc.

368 **Wiring Devices** — Catalog 60, about 80 pp, presents ordering data on wiring devices including a wide range of switches, convenience outlets, lampholders, fluorescent devices, cord connectors, adapters, wall plates, accessories etc. Fully illustrated with photos, catalog provides condensed information on features, dimensions, applications. Pass & Seymour, Inc.

369 **Fuses for All Uses**—This revised edition of manufacturer's complete line, Folder 3, includes illustrations and descriptions of fuses for every purpose. Features dual-element cartridge fuses for time-lag in protection against overloads, and delay renewable fuses and renewal links. Economy Fuse & Mfg. Co.

370 **Battery Service Tips** — Latest information on industrial batteries on cycle service, including industrial truck units, is provided in the new edition, about 40 pp, of company's industrial battery service manual. Includes photos, charts, tables, repair methods, maintenance, and salient points on operation, instructions covering repairs. C & D Batteries, Inc.

372 **For the Missile Field**—Designing, testing and manufacturing facilities for producing electrical equipment used by the missile industry are featured in 8-pp Bulletin 2707.

Users report savings on operating costs when BROOK A.C. MOTORS furnish power for compressors, pumps, conveyors and machinery in factories, mills and mines. Brook Motors require less maintenance. There is no finer motor built, yet they *cost less.* All standard enclosures, including NEMA Rerates. 1 to 600 H. P. Warehouse stocks, factory representatives and dealers coast-to-coast. Send for literature.

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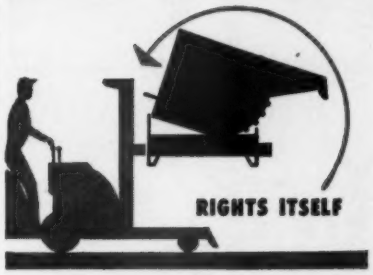

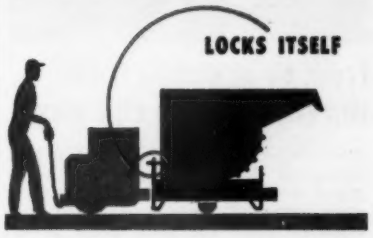

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Here's the fastest, lowest cost method ever devised for handling all kinds of bulk materials . . . hot or cold . . . wet or dry . . . such as:

Punch Press Parts . . . Cinders
Hot Forging or Castings . . . Scrap Metal
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A Roura Hopper fits any standard lift truck . . attached or detached in seconds . . can't slip off. One man does the entire job. Picks up loaded Hopper with lift truck . . . transports it to destination . . . flips the latch . . . and the Hopper automatically dumps its load, rights itself, locks itself. Cuts costs 50% or more.

They're sturdily made of heavy 3/16" steel plate with continuous arc-welded joints. Five sizes from ½ to 2 yards capacity. Fitted with live skids or a choice of wheels. Standard models available for immediate shipment from stock. For special applications they can be made of stainless steel or galvanized.

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Self-Dumping
HOPPER

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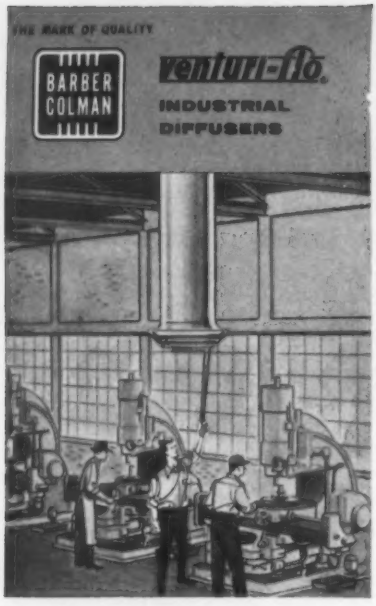
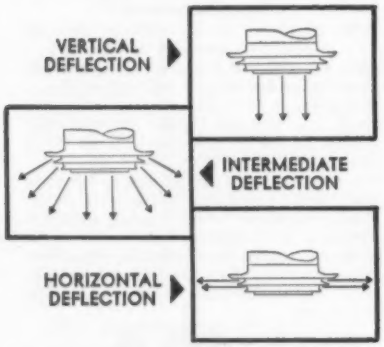


Fresh air at working level improves employee efficiency

Barber-Colman Model BP Venturi-Flo industrial diffusers permit air to be piped down to working level. This prevents stagnant, smoky air which has collected near the roof, from being mixed with the incoming fresh air. The contaminated air is readily expelled by roof exhaust fans. Employee comfort and efficiency are measurably improved.

The Venturi-Flo industrial diffuser can be adjusted easily from the floor to deliver any air pattern. In warm weather, the air should be delivered close to, or even directly at, the worker; while



during cool evenings, or in cold weather, the air should be diffused above the head of the worker, providing adequate ventilation, but eliminating cold drafts.

A complete range of sizes is available to meet any industrial requirement. Get complete information in Bulletin F7722-1 — performance data, installation diagrams, and dimensions. Call your Barber-Colman field office or write:

BARBER-COLMAN COMPANY

Dept. O, 1139 Rock Street, Rockford, Illinois

For more facts circle 655 on Reply Card

234

DATA FILE

(Begins on page 226)

Condulet electrical equipment and floodlights are described. Crouse-Hinds Co.

373 Cable Troughs — This 12-pp catalog offers a simple solution to any design problem of change of direction or elevation with a complete set of standard fittings, horizontal elbows, inside and outside vertical elbows, ties, crosses, covers and many special devices. The Globe Co.

374 Cable Supports—This information folder contains data on company's cable supporting equipment, telling how to install cable supports, giving advantages of cable trough. T. J. Cope Div., Rome Cable Corp.

LIGHTING, COMMUNICATION

375 Architectural Floodlighting — Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose models. General Electric Co.

376 Incandescent Lighting—The 24-pp "Incandescent Lighting Guide Book" features sections on the general advantages of incandescent lighting, the history of incandescent lamp developments, and includes chapters on basic types, bulb shapes, sizes, glass types and finishes, and bases. Sylvania Electric Products Inc.

377 Lighting Standards — The 1958 Edition of the RLM Standard Specifications Book, a reference guide for industrial lighting units, has been strengthened in the areas of efficiency, design and construction quality. New specifications are also included covering two- and three-lamp special service fluorescent units, three types of units utilizing 800 ma fluorescent lamps, new incandesecent reflector sizes, and mounting specifications. RLM Standards Institute.

378 Lighting Maintenance Tips — Principles and advantages of good lighting practice are presented in this 48-pp lighting maintenance manual. Much useful information has been added to this revised edition, including a guide to trouble shooting fluorescent installations, a section on planning group replacement of lamps, and a section on planning a program of cleaning. Champion Lamp Works.

379 Signal Equipment — Tips on how to select suitable signals for any specific operations are offered in Bulletin 100. Describes horns, bells, warning lights, other signal equipment. Specifications, photos, wiring diagrams, dimensions, audibility rating charts, electrical characteristics. Federal Sign & Signal Corp.

PACKINGS AND SEALS

380 Internal Mechanical Seal—Bulletin CP-575 features Chemical & Power internal seals styles IUA and IUB. They are recommended for use at pressures from 28" Hg vacuum to 100 psi and from—80 to 500 F. Chemical & Power Products, Inc.

381 Rotary Seal Data—Plant engineers concerned with process equipment will find it easy to select the right type of mechanical seal for a specific operating condition with Form 480, a 16-pp, catalog on rotary mechanical seals. It is extensively illustrated with cutaway views showing stuffing box installation details. Durametallic Corp.

382 Piston Packing — Sixteen-pp Bulletin 5503 presents engineering data on Darcova Pumcups for packing pistons of air cylinders, hydraulic cylinders and reciprocating pumps. Included are operating diagrams and a list of typical installations, as well as helpful data on Pumcup compositions, textures and types made available for specified pressure, other conditions. Darling Valve & Mfg. Co.

PUMPS, COMPRESSORS

383 General Purpose Pumps—Section B, 36 pp, describes rotary pumps for general purpose use. Explains positive displacement principle incorporated, gives suggestions for selecting proper materials of construction.

Are you making a lot of frantic phone calls when a single call to the right man would serve all your wire and cable needs?

MEET THE MAN WHO CAN HELP YOU...

. . . on page 162

DATA FILE

(Begins on page 226)

Application and ordering information is provided on mounted and unmounted small pumps, large mounted pumps, pumps for operations requiring greater sealing, and large, totally enclosed models. Viking Pump Co.

384 **Multi-Stage Pumps**—Featured in 18-pp Bulletin Form 7251 are multi-stage centrifugal pumps for the medium pressure field. Simplified design is illustrated with a large cutaway view showing component features. A table of parts interchangeability is included, along with other engineering and selection data. Ingersoll-Rand.

385 **Centrifugal Pumps**—Catalog A-156 describes and illustrates company's line of double-suction single-stage centrifugal pumps. Features are detailed, and cross section drawings and construction details are included. C. H. Wheeler Mfg. Co.

386 **Continuous Flow Pump**—Bulletin 30-C, 8 pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, specifications. Robbins & Myers, Inc.

388 **Single Suction Pumps**—Ball bearing single suction pumps are illustrated and described in 24-pp Bulletin 976-G. General data and specifications are included, as well as rating tables, outline dimensions, sectional reference drawings, and other features. Buffalo Pumps, Div. Buffalo Forge Co.

389 **Low Pressure Compressors**—Eight-pp Bulletin A-95 describes a line of low pressure compressors for heavy duty industrial applications. Engineering design features are detailed. Joy Mfg. Co.

390 **Air Compressors**—Bulletin CAS-17A describes a line of two-stage-air cooled, industrial air compressors. Features and advantages are listed, typical applications pictured, and specifications and other data included. Curtis Mfg. Co.

391 **Stationary Compressors**—Sixteen-pp Catalog 5910 describes features and advantages of a line of stationary air compressors designed for a variety of industrial needs. Tables of weights, code words, and dimensions are included, as well as schematic diagrams, cutaway views showing design details, and other data. Schramm, Inc.

INSULATION PROTECTION

392 **Fibre Glass Insulation**—Advantages of fiber glass as a thermal and acoustical insulation are detailed in this illustrated bulletin. Typical ap-

THE MARK OF QUALITY
BARBER COLMAN

Motor Operators for control of

valves, dampers, sequencing devices and other similar applications

Barber-Colman offers a line of electric motor operators for operation of a wide variety of control mechanisms. A few applications include steam and water valves, butterfly valves, multiple ratio fuel valves, oil and gas burners, Vortex control, speed-changing screws, exhaust dampers.

FEATURES

Control Forms
Two-position, floating, proportional.

Valve Linkages
Wide variety of factory-assembled Barber-Colman motor-operated valves available. Motor operators may be used to operate other makes and types of rotary or slip-stem valves.

Output Torque Range
16 to 750 lb in.

Adjustable Timing
Optional.

Power Requirements
24, 115, or 230-volt, a-c only.

Limits of Travel
180° standard. Other limits available.

Auxiliary Switches
Some models incorporate built-in auxiliary switch. Auxiliary switch kits available for others. Adjustable.

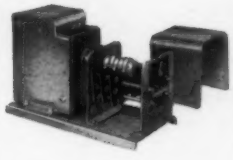
Output Shaft
½" or ¾" diameter, depending upon output torque.

Gear Train
Precision-hobbed gears.

Typical Motor Operator

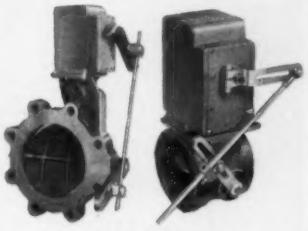
Adjustable Drive Crank
Crank arm range adjustable from ⅞" to 3⅛". Adjustable on shaft through 360°.

Oil-Submerged
Barber-Colman shaded pole induction motor and gear train sealed in oil for long life and maintenance-free operation.



Sequence Controller

Globe Valve



Butterfly Valves

Proportional Motor Operator with Integral Temperature Sensing Bulb and Control Mechanism.

Provides proportional control of temperature regulating devices—a control system in itself for many applications. Can be used on any valve assembly or controller normally furnished with Barber-Colman proportional operators. Positive positioning. Adjustable throttling range. 10 feet of armored capillary furnished as standard. Two-wire connection to any convenient 115-volt power source.

Call your Barber-Colman control office or write today, outlining your requirements.

"Better Control . . .Electrically"

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PUMPS ON YOUR MIND?

Send for this VIKING Pump Data

VIKING ENGINEERING DATA — A 36-page pump engineering manual is yours for the asking. It fully explains the 10 easy steps in selecting Viking rotary pumps. Ask for catalog KZ.

VIKING HEAVY DUTY PUMPS — Available in 10 to 1050 G.P.M. sizes, these rugged Vikings are suitable for pressures up to 200 PSI. Complete with specifications, performance data, etc., they are illustrated in the 24-page catalog CZ.

VIKING GENERAL PURPOSE PUMPS — These Viking Pumps — in ⅔ to 1050 G.P.M. sizes — are suitable for pressures up to 100 PSI. They are fully illustrated and have specifications, performance data, etc., in the 36-page catalog BZ.

All Viking Pumps are positive displacement pumps and deliver either thin or thick liquids.

VIKING — the leader, not a follower, in Rotary Pumps

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DATA FILE

(Begins on page 226)

plications are illustrated and standard specifications included. Pittsburgh Plate Glass Co.

394 For Insulation Protection—Provided in this comprehensive looseleaf manual is technical information covering practically every requirement for insulation protection. An aid to proper adaptation and application of mastics, flashing compounds, adhesives and surface coatings, this book presents information classified as to industry usage, as power, process, cold storage. Book is available to qualified plant engineers. Benjamin Foster Co.

HEATERS, HEATING

396 Unit Heaters—Catalog 158, 28 pp, contains performance and application data on company's line of unit heaters, including design and construction details, dimension diagrams, and tabulated information on steam capacities, conversion factors, hot water capacities, performance factors. Modine Mfg. Co.

397 Heating and Ventilating—Company's "comfort curtain" principle of heating and ventilating is described in this 8-pp bulletin. Advantages are detailed and typical installations pictured through drawings and photos. Lennox Industries Inc.

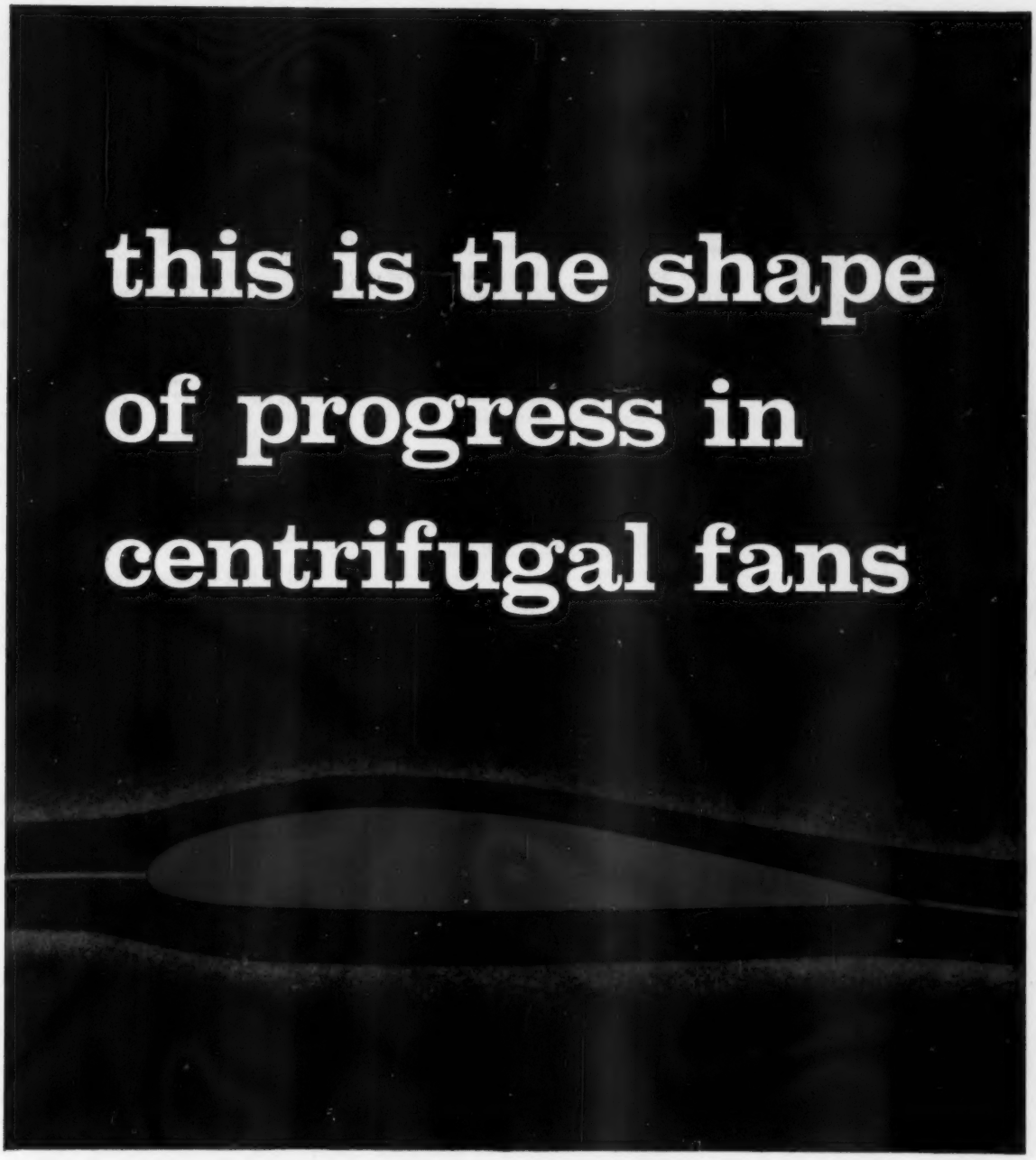
398 For Heating Systems—A great deal of helpful information on heating systems is presented in Engineering Data Manual 2695, 28 pp. Detailed illustrated information pertaining to heating problems is given. Besides covering heating terminology there are sections on steam data, water properties, piping data, weights and measures and pipe dimensions. Dunham-Bush, Inc.

399 Direct Fired Heaters—Complete description and specifications on unit heaters, duct furnaces and heavy duty heaters are presented in 12-pp Bulletin A1-1.2b. Cutaway views and construction features are included. Reznor Mfg. Co.

401 Electric Heating Units—Catalog 50, 50 pp, contains complete engineering data on electrical heating units and equipment, including strip elements, finstrip elements, tabular elements, cartridge elements, ring elements, immersion heaters, circulation heaters, radiant heaters, forced air duct heaters, unit heaters, hot plates and others. Includes photos, dimensional drawings, prices, standard rating tables, and specifications. Edwin L. Wiegand Co.

FILTERS, STRAINERS

402 Filtration Equipment—Eight-pp Bulletin GEO-506 describes filtration equipment for micronic clarification of all types of fluids; lubri-



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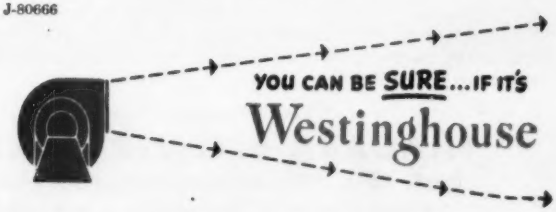

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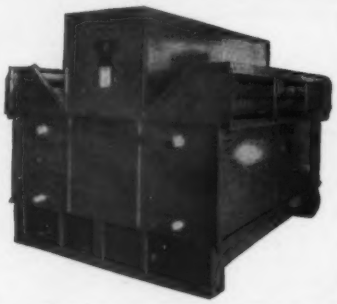

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(Begins on page 226)

cating and fuel oils; liquid chemicals and petro-chemicals; compressed air, carbon dioxide, and other gases; hydraulic fluids; electroplating solutions; coolants. Commercial Filters Corp.

403 **Pipe Line Filters** — Eight-pp Bulletin 200 contains detailed information on pipe line filters for air and other gases. Double action principle which gives sustained, trouble-free operation at high load factors is illustrated and explained. Specifications are included. Dollinger Corp.

404 **Filters, Strainers** — Industrial Catalog 1058, 48 pp, provides application and engineering information on company's line of micro-filters and precision strainers. Fuel filters, full flow and by-pass lube filters, dry type air filters, air separators, and metal edge strainers for fuel lube and industrial use shown. Purolator Products, Inc.

405 **Self-Cleaning Strainer**—Bulletin 1210B describes self-cleaning, semi-steel pipeline strainers in sizes from ¼ through 3 in., featuring high strength construction of the bodies, long tapered screen socket, perforated heavy-gage screen. Includes dimensions, weights. Sarco Co., Inc.

VALVES, TRAPS, PIPING

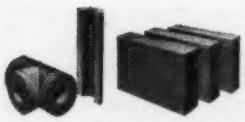
406 **Valve Performance Facts**—Included in this 36-pp booklet are 32 case histories of cost-saving valve installations. Service applications covered include steam, oil, water, coating fluid, chlorine, phenol, pulp stock, vacuum, others. Crane Co.

407 **Solenoid Valves**—Featured in this 8-pp bulletin are packless solenoid valves designed to permit more flow at any pressure up to maximum rated capacity. Specifications and performance charts are included, as well as flow patterns, dimensions and a selection chart. C. A. Norgren Co.

Reader Service Cards for ordering bulletins are on pages 221-222. Be sure to include your name, job title, and company, even if you want bulletins mailed to your home address.

408 **Industrial Valves**—Bulletin 507V illustrates and describes company's line of industrial valves for control of air, gas, liquids and solids. Features photos and descriptive detail on a variety of valves, including butterfly valves, water valves, slide valves. W. S. Rockwell Co.

409 **Blow-Off Valves**—Bulletin B 427, 20 pp, describes features and advantages of company's blow-off valves for boiler pressures up to 415 lb. Covers construction details, materials used in the valves, and includes



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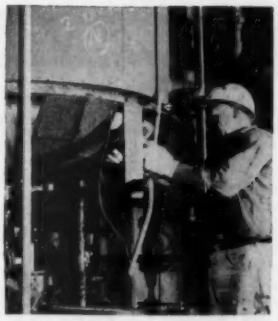

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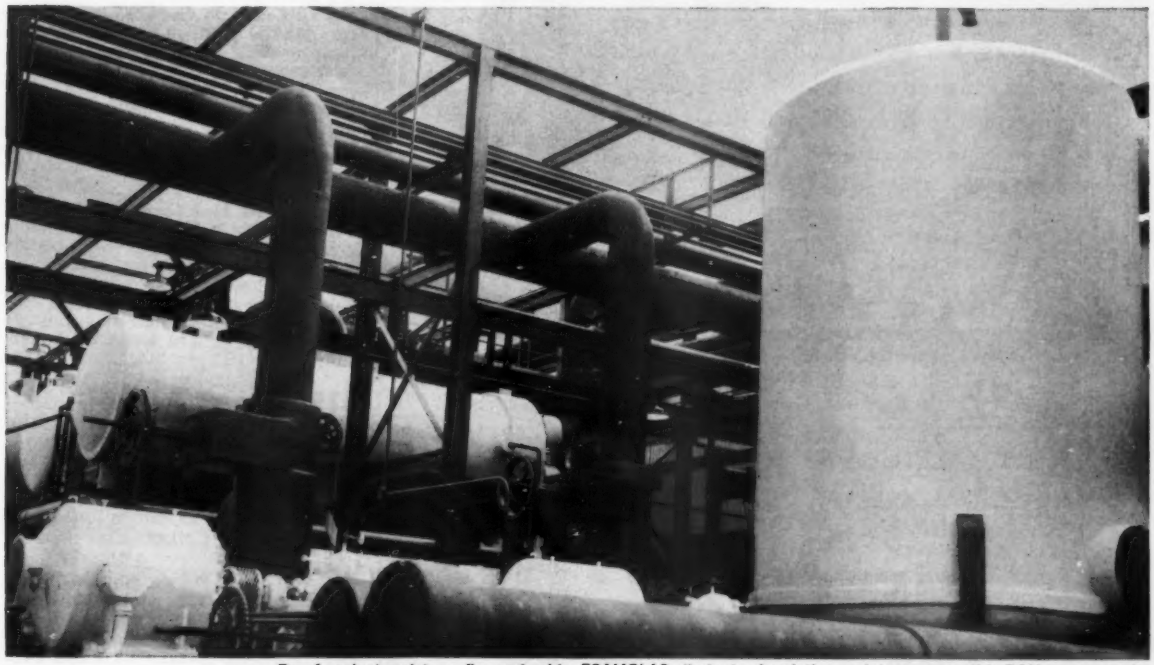

Proof against moisture, fire and acids, FOAMGLAS eliminates insulation maintenance on this R&H process unit.

PITTSBURGH PC CORNING

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(Begins on page 226)

specifications, weights and dimensions, tables of average physical and chemical properties of materials, etc. Yarnall-Waring Co.

410 Combination Valves—Described in this 16-pp bulletin are combination silent check valves and combination pump valves for industrial services. Information on materials and features is given, as well as working pressure tables, loss of headgal per min curves, and other data. Combination Pump Valve Co.

411 Stainless Steel Valves—Corrosion resistant stainless steel valves are featured in 32-pp Catalog 59SS. Features of design and construction are shown through cutaway views, and advantages of stainless steel in withstanding corrosive attack of chemicals and atmospheres are detailed. Corrosion resistance table is included, as well dimensions. Jenkins Bros.

412 Air Valve—A high velocity air valve, composed of gang operated, Neoprene vane sections is described in 8-pp Catalog F-8752. Engineering data, dimensional, descriptive and application information is included. Barber-Colman Co.

ROCKWELL

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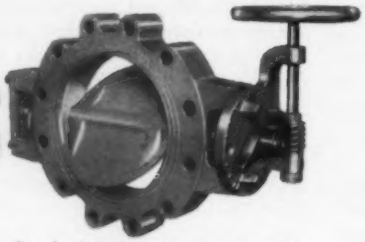

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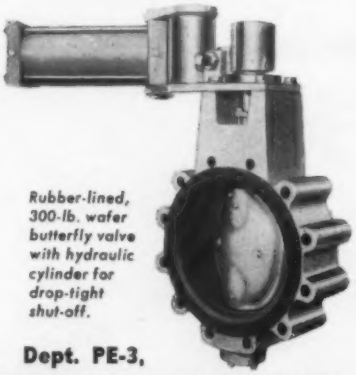

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413 On Steam Traps—Catalog K is an enlarged 48-pp manual and steam trap catalog. New material provided includes open float and thermostatic traps, pipe strainer to 6 in. in steel and semi-steel, and helpful steam pipe sizing tables. Discusses fundamentals of good trapping, trap selection, installation, testing, troubleshooting, and repairs. Armstrong Machine Works.

414 Glass Pipe and Fittings—Corrosion-resistant qualities of this Pyrex brand glass pipe and fittings which make it suitable for use under corrosive conditions are described in 44-pp Bulletin PE-3. Operating temperatures, physical characteristics, installation procedures are covered and specifications and dimensional drawings given. Corning Glass Works.

415 UPVC Pipe, Fittings—Technical data and installation information on unplasticized polyvinyl chloride pipe are provided in 24-pp Booklet TTP-119. Also gives specifications for threaded and socket types of UPVC fittings, valves and flanges, of normal and high-impact material. Tube Turns Plastics, Inc.

416 Expansion Joints—Features and advantages of company's line of expansion joints and flexible couplings are illustrated and described in 12-pp Form AD-137. Standard dimensions and other engineering data are included. The Garlock Packing Co.

417 Guide to Couplings—This 26-pp general catalog describes company's quick-connect, quick-disconnect couplings, including a coupling for high pressure applications, for impact in air lines, for low pressure applications, for vacuum and very low pressures, and difficult fluids. Snap-Tite, Inc.

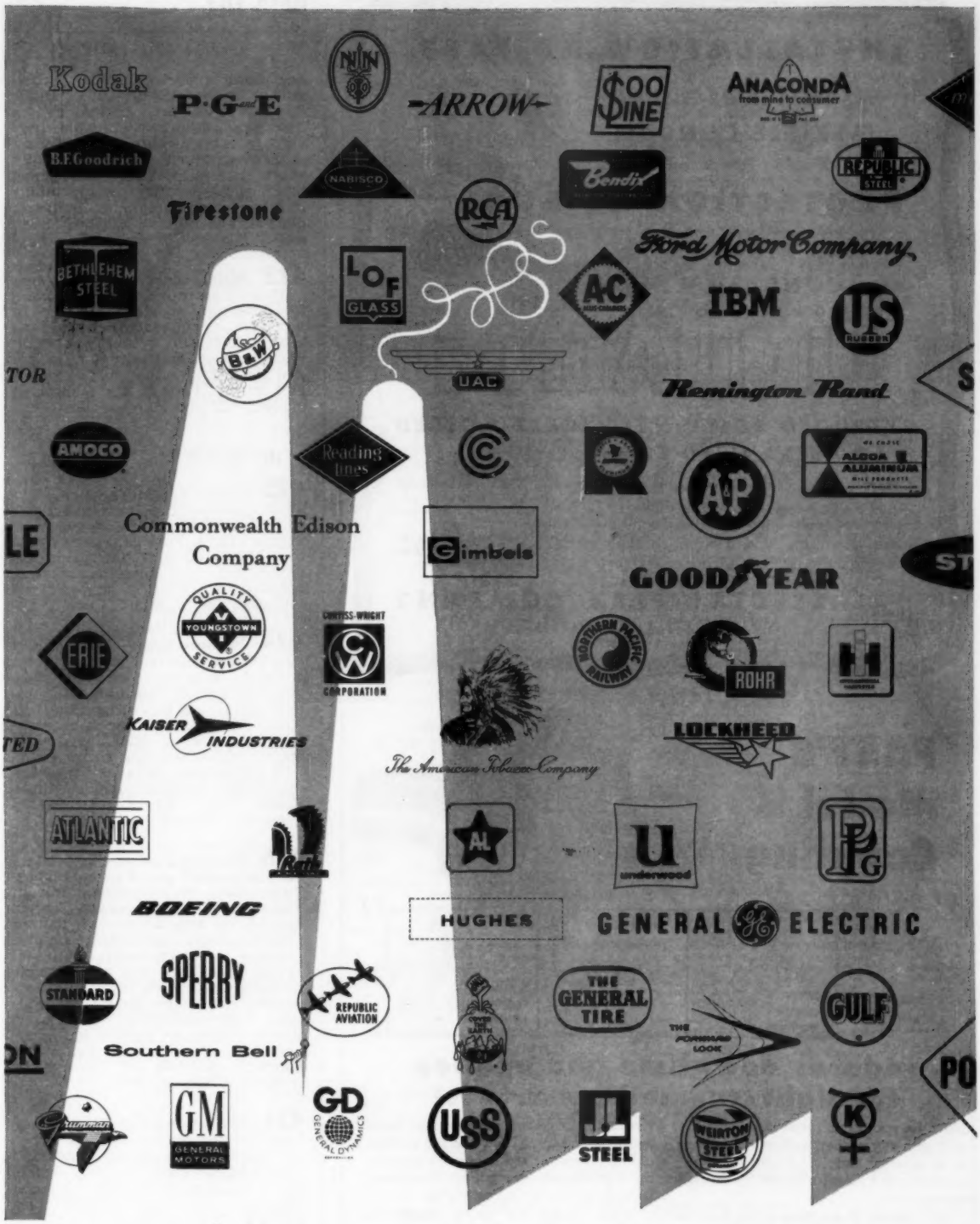
418 Fluid Line Couplings—Catalog 100 contains data sheets describing company's line of quick-connective fluid-line couplings for pneumatic, hydraulic, oxygen, acetylene, steam, various gases and liquids service. Photos and dimensional diagrams are included, as well as tables of dimensions. The Hansen Mfg. Co.

419 Swivel Joint—Features and advantages of company's swivel joint which permits fast, easy packing interchangeability are illustrated and described in Bulletin 1258 Table of specifications and properties are included, as well as dimensional data and diagrams. Chiksan Co.

420 Bellows Design Guide—Twenty-pp Catalog 155 contains helpful information on applications, design considerations, and standards for metallic bellows. Details on using bellows manufactured from various metals are included. Flexonic Corp.

METALS

421 Aluminum and Steel Data—Comprehensive selection data on aluminum and steel available in stock



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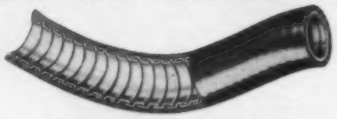

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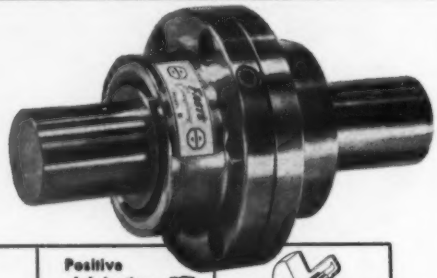

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for almost every application is presented in this 242-pp buying guide. Necessary weights, dimensions and descriptive data are tabulated. Individual sections cover structural shapes, construction products, plates, sheets, hot rolled bars, cold finished bars, alloy and tool steel, tubing, stainless steel, aluminum, industrial plastics, and others. Joseph T. Ryerson & Son Inc.

422 Molybdenum in Steel Castings—This 36-pp brochure on the role of molybdenum in steel castings for industrial equipment discusses hardenability, tensile properties, fatigue, harness, wear and impact resistance, machinability, and weldability of cast steels. Graphs and charts included. Climax Molybdenum Co.

INSTRUMENTS, CONTROLS

423 Gages, Needle Valves—Catalog 76-G consists of a loose-leaf bound collection of literature on gages and needle valves. Various types of gages are illustrated and described, with applications and specifications fully detailed. A section on accessories is included. Jas. P. Marsh Corp.

424 Pressure Gages—In 16-pp Catalog 305 are described gages, with and without integrated switches, used most widely in operation of power and steam plants, refrigeration systems, metal working industries, hydraulic presses, and others where steam, water and non-corrosive oils and gases are principal measured media. Specifications included. United States Gauge, Div., American Machine and Metals, Inc.

425 Precision Instruments—Catalog G1 contains 32 pp of comprehensive information on indicating, recording and controlling instruments. Contains descriptive and illustrative data on potentiometers, pyrometer supplies, systems and components, null indicators, amplifiers and oscillographs, pressure gages, flow and liquid level meters, pneumatic remote transmission, thermometers, panelboards, valves, diaphragm motors and motorized valve assemblies, motor and dampers, switches, etc. Minneapolis-Honeywell Regulator Co.

426 For Limited Panel Space—Bulletin 532 describes Model 216 indicator used with company's automatic tank contents gage. Bulletin contains a full illustration of indicator which, although occupying a small space, has a scale 20 in. long. The Liquidometer Co.

427 Ion Exchange Controls—Six-pp Bulletin E-156 describes automatic controls for ion-exchange equipment. Various elements in the control cabinets, as well as all the power-operated units, are covered and construction features are detailed. Illinois Water Treatment Co.

428 **Graphic Instruments**—Featured in 16-pp Catalog 657 is a line of graphic instruments designed to serve a variety of industrial measuring applications. Complete descriptive details on various types of recorders and accessories are included, as well as photos and ratings data. The Esterline-Angus Co., Inc.

FANS, BLOWERS

429 **Mechanical Draft Fans**—Eight-pp Catalog 1361 describes centrifugal fans designed for handling abrasive gases at elevated temperatures. Complete application, performance, and physical data are given, as well as a list of accessories. Sturtevant Div., Westinghouse Electric Corp.

430 **Induced Draft Fans**—Catalog L-3 describes induced draft fans designed for any induced draft application for temperatures up to 800 F. Gives dimensions, capacities, as well as installation data. Fuller Co.

431 **Fans and Blowers** — Bulletin A-108, 16 pp, contains installation, operation and maintenance information on fans and blowers for many applications. Typical centrifugal blower performance is plotted on curve, and other engineering data such as designation of rotation and discharge, motor data, definitions. Castle Hills Corp., Hartzell Propeller Fan Co.

432 **Air Engineering**—Bulletin E-57 is a 24-pp air engineering data file covering engineering and test facilities for propeller fans, specifications, construction, maintenance, and installation. Tables for estimating air-handling requirements, entrance and elbow losses are provided. Aerovent Fan Co., Inc.

433 **Standard Duty Fans**—Designs and construction details of company's line of standard duty fans are covered in 28-pp Bulletin 543. Points out advantages, shows arrangement and application, describes accessories. The New York Blower Co.

434 **Air Handling Units**—Complete engineering information on company's low pressure sprayed coil and high pressure dry and sprayed coil climate changers is incorporated in 56-pp Bulletin PB-290. Detailed descriptions and illustrations on the all-purpose air conditioners for commercial and industrial comfort and process applications included. The Trane Co.

435 **Industrial Exhausters** — Bulletin 471 contains detailed information on features and arrangements of company's industrial exhausters designed for applications requiring moderate air pressures and large air volumes. The Day Co.

436 **Centrifugal Fans**—Bulletin 257 contains 32 pp of detailed information on direct connected and belt drive fans for ventilating and air conditioning installations. Sections of bulletin cover engineering and construction details and general engi-

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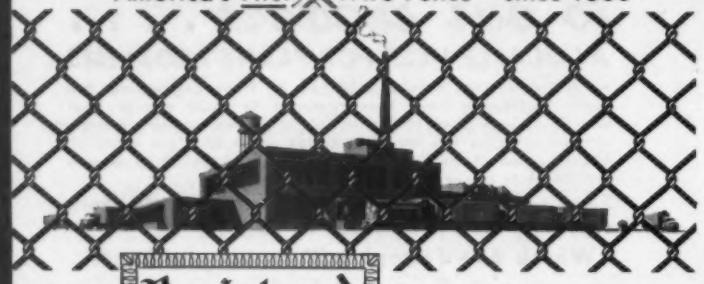

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DATA FILE

(Begins on page 226)

neering data, general fan performance laws, and specifications. Ilg Electric Ventilating Co.

DUST, FUME CONTROL

438 **Industrial Dust Control**—Bulletin 104, 36 pp, on company's dust filters, gives detailed information about dust control systems and how to engineer them. Includes description of the Roll-Clean Dynaclone dust filter, as well as information, capacities and dimensions for other Dynaclone and automatic continuous dust filters, intermittent filters, others. The W. W. Sly Mfg. Co.

440 **Industrial Dust Control**—A wide variety of collection methods for industrial dust control is described in 16-pp Bulletin 922. A typical case history is included as well as photos, cutaway views, drawings and capacity data. Pangborn Corp.

441 **Dust, Fume Control**—A wide range of industrial dust and fume producing processes that can be successfully controlled with the properly designed cloth or glass bag-type dust collectors is covered in 24-pp Bulletin 562-D. Operating principles are illustrated. Wheelbrator Corp.

BOILERS AND GENERATORS

442 **Self-Contained Boilers**—Bulletin AD-162, 8 pp, describes company's complete line of self-contained boilers for heating and processing steam or hot water. Design features and advantages are detailed and a cutaway view showing flow of air in the forced draft system is included. Cleaver-Brooks Co.

443 **Hot Water Boilers** — Catalog HCC-2, 20 pp, describes and illustrates design, construction, advantages and economics of company's controlled circulation hot water boiler for supplying high pressure, high temperature water for heating systems and process applications. Comparisons of heat content—water vs steam—is included on table. Combustion Engineering, Inc.

444 **Steam Generator**—Bulletin 582 CS describes design and operation features of company's vapor water tube steam generator which differs from conventional water tube steam generators in the initial heating and final vaporization occur in the shell. TXT Texsteam Corp.

445 **Boiler Construction** — Bulletin BE100 describes advantages of practical boiler construction with 2 pass design, featuring comparable results with equal heating surface, but with Continental's two-pass features—turbulent spinning gas technique-uniform heating-no refractory baffles and symmetry of furnace layout. Boiler Engineering & Supply Co.

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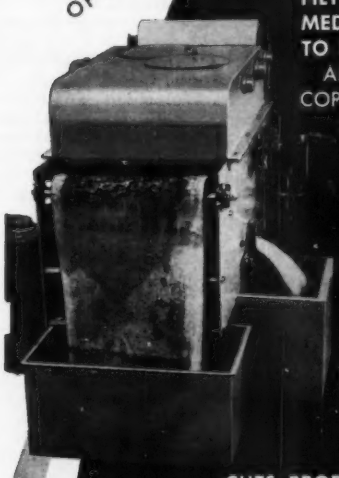

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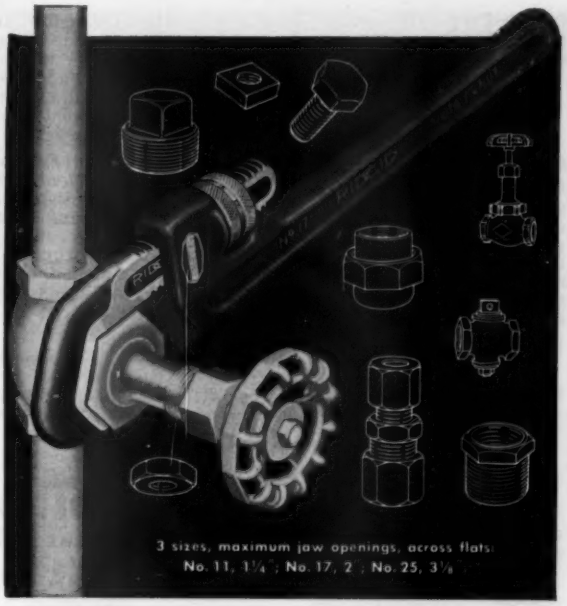

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DATA FILE

(Begins on page 226)

MECHANICAL POWER TRANSMISSION

446 Chains, Sprockets—Catalog 757, 68 pp, on company's stock roller chains and sprockets, stresses advantages gained through roller chain use, and pictures some typical roller chain drives. Tells how to select stock roller chain drives. Provides specifications, ratings, prices and engineering data required for ordering. Book is generously illustrated with photos. Diamond Chain Co., Inc.

447 On Drive Selections—Steps in selecting a heavy duty V-belt drive are outlined in 16-pp Bulletin DH-301. Service factor table, design horsepower table, minimum installation allowance table and complete selection tables are included. The Gates Rubber Co.

448 Anti-Friction Bearings — Catalog 424-B, entitled "The broadest line in the anti-friction field," an 8-pp folder giving capsule presentation of company's entire product line. A brief description of each product is accompanied by a halftone illustration and cross-section drawings. SKF Industries, Inc.

449 Mill Bearings—Eight-pp Book 2665 describes company's line of mill bearings with heavy duty, self-aligning roller bearings and steel housings. Dimensional data and diagrams are provided. Link-Belt Co.

450 Self-Aligning Coupling — Featured in this illustrated bulletin are company's self-aligning forged steel couplings designed to transmit maximum torque indefinitely. A cutaway view showing component features and tables of ratings are included. Koppers Co., Inc.

451 Flexible Couplings—Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings and discusses design. Thomas Flexible Coupling Co.

452 Steel Conveyor Pulleys—Bulletin A671A contains 12 pp of information on features and advantages of company's steel conveyor pulleys. Tables and diagrams give essential dimensional data. Dodge Mfg. Corp.

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WATER TANKS

453 Elevated Water Tanks—These colorful single-sheet reprints illustrate two typical elevated water tank installations. Useful tables on the back list standard sizes of the various type of tanks available. Graver Tank & Mfg. Co., Inc.

454 Tripod Elevated Tank — This illustrated bulletin describes the Horton tripod elevated water tank, designed to provide economical gravity water pressure for general service and fire protection in private water systems, others. Standard sizes included. Chicago Bridge & Iron Co.

MAINTENANCE

455 Basic-Roofing Information — "What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses roofing practices. Johns-Manville.

457 Metal Treatment — This illustrated booklet describes a metal treatment that stops rust action and prepares rusted metal for paint. Advantages are detailed and application method illustrated. Rusticide Products Co.

458 Zinc Coating—Describes in this bulletin are properties and advantages of Dimetcote 3, an inorganic zinc coating which "cold galvanizes" any steel surface. Typical applications are illustrated and general, physical and chemical properties listed. Amercoat Corp.

459 Guide to Maintenance Products —Catalog 56, 48 pp, on industrial maintenance paint products lists specialized coatings to resist alkalies, acids, oils, grease, moisture. A complete buyers' guide, this book includes, beside maintenance coatings, waterproofing, roof coatings, caulking compounds, floor patching materials. Steelcote Mfg. Co.

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. . . on page 162

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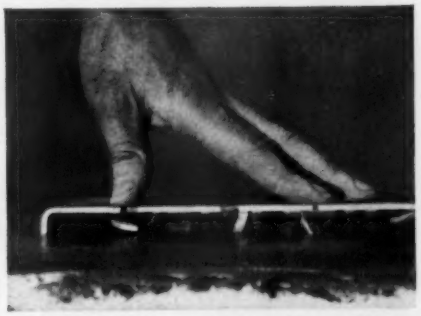
ANCOR FLOOR PLATES BY WHEELING

1

Remove loose flooring material and pour a 1½" to 2" layer of fresh concrete.

2



While it's wet, position Ancor Plates and gently tap them to proper level.

3

Let concrete harden around the 53 steel anchors on each plate. Floor's ready!

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That's all there is to it. Three simple steps . . . and you have a quiet, permanent floor. It's a *safe* floor, too. There are 33 concrete safety islands in every square foot. Write for details on Ancor *Rolled Steel* Floor Plates. Ackermann Manufacturing Company, subsidiary of Wheeling Steel Corporation, Wheeling, W. Va.

IT'S WHEELING STEEL

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DATA FILE

(Begins on page 226)

LUBRICATION

461 Plug Valve Lubricants—Reference Book 39—Section 5A, 16 pp, describes company's plug valve lubricants and lubrication accessories. Standard lubricant table gives detailed description and extreme temperature range of each lubricant. Homestead Valve Mfg. Co.

462 Lithium Greases—This product information bulletin presents manufacturer's six Litholine industrial greases, stressing industry advantages offered by these multi-purpose greases. Gives properties of the greases, general application and performance characteristics. Sinclair Refining Co.

463 Organized Lubrication—Benefits of organized lubrication are extolled in this 24-pp bulletin. Cost control opportunities are detailed and the task of assigning responsibilities and delegating authority in an organized lubrication system discussed. Method of determining savings and setting up records to measure results covered. The Texas Co.

464 Product Guide—This handy little booklet gives information on manufacturer's line of industrial products—general lubricants, greases, diesel lubricating oils, metalworking oils, hydraulic oils, heat-transfer oils, waxes, petro-chemicals, spray oils, solvents, others. Sun Oil Co.

PLASTICS, SYNTHETICS

466 Guide to Plastics—This 64-pp catalog contains detailed information on plastic sheets, rods, tubes, films and lay-flat tubings. Cements, pigments and miscellaneous supplies are also listed. Among data furnished are sizes, weights, color ranges, textures, specifications, grades and prices. Includes comparison tables of chemical, electrical and mechanical properties; enables comparison of acetate, acrylic, butyrate, Implex, Kel-F, Mylar, nylon, phenolic, polyethylene, polystyrene, high impact styrene, Teflon and vinyl. Cadillac Plastic & Chemical Co.

467 Silicone Rubber—Advantages offered by silicone rubber cables and wire are detailed in 8-pp Bulletin SR-58-5M. Properties of silicone rubber insulated wires and cables are described, as well as applications and construction, and tables of engineering data are included. Rockbestos Products Corp.

OTHER EQUIPMENT

468 Heat Exchanger—Bulletin 132 describes company's sectional heat exchanger which offers a completely self-contained system independent of any considerable water supply. Diagram explaining functions and installation photos included. Niagara Blower Co.

469 Industrial Finishing Equipment—Catalog A 657, 12 pp, describes a complete modern finishing system for cleaning, rust proofing, drying, painting and finish baking. The R. C. Mahon Co.

470 Cyclone Separators—Featured in 8-pp Bulletin 712 are company's cyclone separators and pipe line after-coolers designed to provide cool, dry and clean compressed air and gases. Cutaway views illustrate component parts and features, and capacity tables facilitate selection. R. P. Adams Co., Inc.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on pages 221 and 222.

472 Air Pollution Control—Featured in this 8-pp bulletin are solutions to air pollution control and heat recovery through catalytic oxidation. Typical problems and solutions in organic finishing and drying, chemical industry, oil refinery industry, and food processing industry are detailed, and package catalyst units for all types of applications are described. Oxy-Catalyst, Inc.

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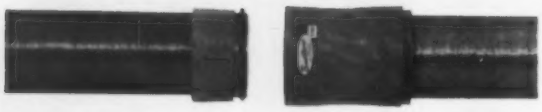

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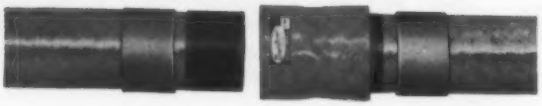

... strong as steel pipe, only one-eighth the weight. Tensile: hoop 80,000 psi, longitudinal 40,000. Highly corrosion resistant. Won't scale, cold flow or deform. 20-foot lengths easy to cut and join; threaded or locking wedge fittings.

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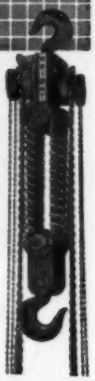
12 Sizes
½-ton to 50 tons

Bulletin 412A gives complete details on the many outstanding features that make Wright Safeways your best buy for long, trouble-free life. Write York, Pa. for your copy.



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Load Chain is finest alloy, every foot proof-tested...heat treated for hard wear-resistant working surface...ductile to withstand shock loads..."wick" lubricated...anti-rust zinc coat.

Load and Idler Sheaves rotate on life-lubricated, antifriction bearings...minimum of 5 pockets in Big Sheaves for efficiency and long life.

Gears, Pinions, Drive Spindle (also top and bottom Hooks) are nickel-chrome-molybdenum alloy steel mounted on heavy-duty, antifriction bearings. *Gear Train* is enclosed in oil-tight chamber.

Load Brake is Weston type, silent, dependable.

Steel Housing fully protects vulnerable parts.

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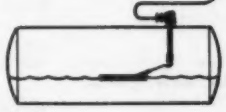

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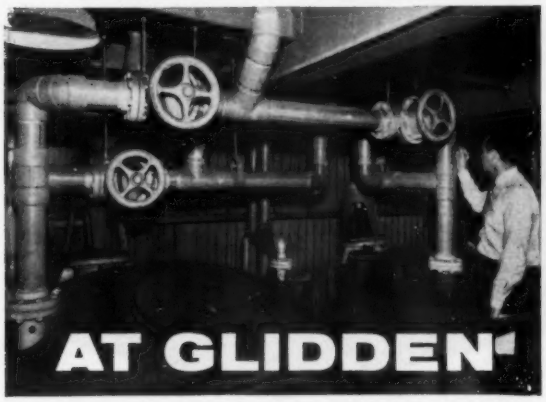

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How you can stop piping corrosion

Complete information on UPVC (unplasticized polyvinyl chloride) piping to aid in design and installation given in Catalog 119. Also describes full line of ttp products . . . fittings, flanges, valves, specialties. Free on request.

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DATA FILE

(Begins on page 226)

474 **Release Agent**—Technical Bulletin 19 describes a release agent which can be rubbed to an imperceptible film for easy parting of epoxy resin castings from plaster molds, or from metal, wood, or epoxy masters. Covers methods of applying and includes prices. Smooth-On Mfg. Co.

475 **Air Conditioning Units**—Bulletin 786 contains 54 pp of selection data on air conditioners, including capacities, standard arrangements, dimensions, etc. Steps in selection of basic unit and components are outlined. First pages are devoted to choosing the physical size based on air capacity and face velocity requirements, while succeeding pages concern themselves with heating and cooling requirements, control. American Air Filter Co., Inc.

476 **Lime Slaker** — Bulletin 255-A describes the complete line of new type lime slaker. This equipment slakes the lime in a form of a paste rather than a slurry. Eliminating inherent difficulties of conventional slakers, the Viscomatic slaker does not require the use of insulation, heat exchangers, high speed mixers, or hot water. Infilco Inc.

477 **Protective Clothing** — Catalog 12000, 12 pp, describes and illustrates company's line of industrial clothing for protection against water, fire, acids and alkalis, slipping and scuffing. Various types of work gloves, suits, and coats featured. The B. F. Goodrich Co.

478 **Consulting Service** — Advantages of company's consulting service are detailed in 8-pp Bulletin 5006-A. How the service is qualified to solve problems concerning scale and corrosion control in boilers, cooling systems, and process waters is discussed. Dearborn Chemical Co.

479 **Insect Control**—Featuring manufacturer's insecticides and insect control equipment, this practical 36-pp booklet provides excellent tips on the control of industrial insects. More than 60 pests are pictured along with specific information on where they are found, identifying features, extent of damage, life stages and cycles, characteristics of existence, and recommended control measures. Ten insecticides are covered in detail. West Chemical Products, Inc.

480 **Fighting Corrosion With Corrosion** — Cathodic protection against rust and corrosion is the subject discussed in this illustrated 19-pp bulletin. Describes the corrosion battery, corrective measures. Electro Rust-Proofing Corp.

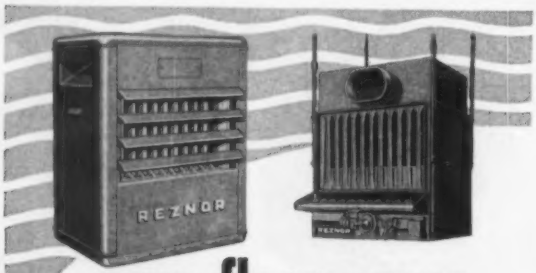
482 **Machine Mounts**—A vinyl cork, sisal machine pad and an adjustable machine mount for reduction of transmitted vibration and no bolting of machine are described in literature available from the company. Clark-Cutler-McDermott Co.

483 **Reproduction Materials**—Photographic papers and films designed for improving drawing and document reproduction are featured in 22-pp Bulletin FI-232. Helpful techniques and economies which these reproduction materials are making possible in drafting room and reproduction department detailed. Eastman Kodak Co.

484 **Magnetic Equipment**—Product and application information on a line of magnetic separators, magnetic automation units, and vibratory equipment is presented in 47-pp pocket-size Booklet B-575. Descriptive information and photos of typical installations. Eriez Mfg. Co.

486 **For Cleaner Furnace**—The use and application of Oxi Crystals to keep furnaces and the fireside of boilers free of slag, encrusted carbon, soot and fire-scale is described in a recently published pamphlet. Oxi Corp.

488 **Products and Services**—Bulletin GSP-901 24 pp, describes products and services of this company and its various divisions. These include ring balance instruments, components for control systems, electronic devices, force measuring devices, water and steam treatment, others. Hagan Chemicals & Controls, Inc.



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If you burn coal *OXI Crystals will increase boiler efficiency* by getting rid of slag, firescale, encrusted carbon and soot *fast* . . . all combustible deposits are completely oxidized from firedoor to the top of the stack . . . all this with very little labor involved.

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Eliminates cooling towers, water filtration, pump, and expensive chemicals.

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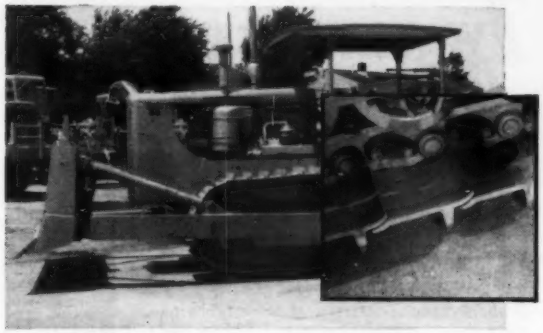

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Give it something it can't get its teeth into... like the toughest industrial flooring made—EMERI-CRETE FLOORING. That's what the H.O. Penn Machinery Company of New York did back in 1954 and not one of the monster earthmovers they sell and service has taken a bite out of EMERI-CRETE FLOORING yet.

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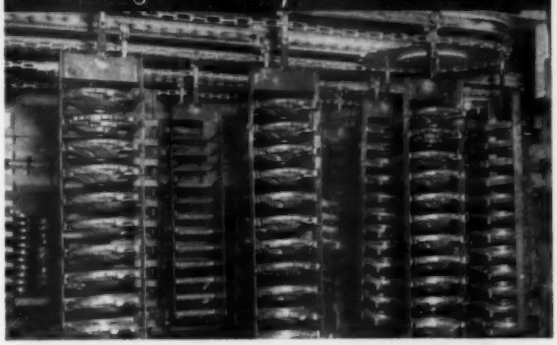
Now both jobs are

A CINCH *for* 2-INCH

RAPISTAN-KEYSTONE OVERHEAD CONVEYOR

light loads weighing "ounces"

heavy loads up to 135 lbs.



Rapistan-Keystone 2" overhead trolley conveyor handles the light loads, of course. But only R-K builds 2" conveyor with the high-payload trolley that handles those heavier industrial loads up to 135 lbs, per trolley. Let us show you how you can make considerable savings on your next overhead installation in this capacity range with a Rapistan-Keystone 2-inch system.

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USG design assures efficient heat transfer through bulb chamber for exact response.

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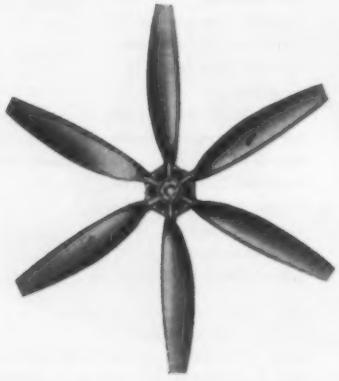
A lot of HOT AIR?

Yes!... half a million cubic feet of it a minute exhausted over glass furnaces by these Hartzell fans



Adjustable pitch fans are cast of corrosion resistant aluminum alloy. Blade pitch adjustment to change air delivery requires simply loosening two bolts. Available in eleven sizes from 40" to 132" — in 3, 4 and 6 blade assemblies.

The exceptionally high air temperature over the glass furnaces in a plant located in New Jersey posed a rather unusual problem for Hartzell engineers. An enormous quantity of 160° air had to be moved very rapidly. The solution was six (two are located on opposite side of monitor) Hartzell 6 bladed 85" fans, each driven by a class "B" insulated 10 H.P. motor — each moving air at 83,000 CFM. High temperature fan belts are used to reduce fan speed to 385 RPM. Motors are all located outside the building, and in such a position that they can be serviced from the roof.

This installation is one of the more unusual ventilation problems that have come up. It points out, however, that each ventilation problem is different — each must be carefully engineered to obtain satisfactory results. Hartzell engineers take pride in having "know-how" to handle any air moving problem. And Hartzell takes equal pride in manufacturing top quality ventilating equipment — both fans and ventilators.

If you have a plant ventilating problem get in touch now with your nearby Hartzell field office. If you don't know where to find it, a note will bring the information at once.

This installation was handled by the Hartzell field office at 333 Arch Street, Camden, New Jersey; phone WOodlawn 4-5256.

here's a complete line of air moving equipment designed and built specifically for industry

Other famous Hartzell products include controllable and full feathering propellers for light aircraft, crop drying equipment and farm ventilating fans.

HARTZELL PROPELLER FAN COMPANY • **51 Thomas Blvd. Piqua, Ohio**
Div. of Castle Hills Corp. A Member of AMCA Engineering Offices in Principal Cities

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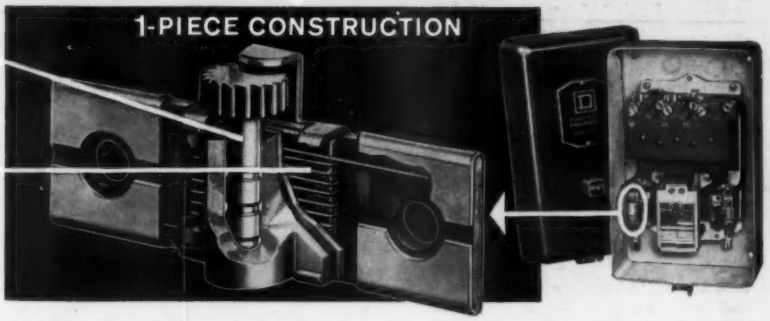
When you buy Motor Starters——

YOU PAY FOR OVERLOAD PROTECTION

...BE SURE YOU GET IT!

Heat-responsive element (solder pot) provides accurate response to overload, yet prevents nuisance tripping.

Heat-producing element is an integral part of overload unit. It's permanently joined to solder pot, can't become misaligned.

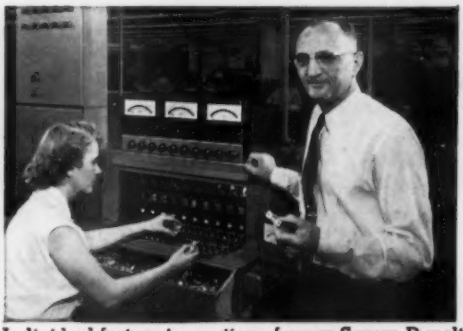


Only ONE-PIECE Overload Relays can give 100% Protection Only with ONE-PIECE construction can you *know* you've installed the heater correctly. Only with ONE-PIECE construction can you *know* the heater is exactly centered, or properly positioned, so that it performs according to its rating. Only with ONE-PIECE construction can you *know* your starters will not operate without the thermal units properly installed. Only with ONE-PIECE construction can you *know* your motors have full protection.

Only Square D has ONE-PIECE Construction ONE-PIECE construction *eliminates* any possibility of heater misalignment. Square D melting alloy thermal overload relays can be installed only one way. They are tamper-proof. They are factory-assembled, are *individually* calibrated and tested. Repeated tripping will not affect their accuracy.

Insist on Square D starters with melting alloy thermal overload relays

Let your Square D Field Engineer show you 1 how one-piece construction is accomplished and how easy it is to mismatch separate heaters and solder pots— 2 an endurance tester to prove that overload units can be reset repeatedly without damage while the solder is liquid — 3 a tripping time tester to compare various types of melting alloy units and to prove that tripping time won't change after repeated operation.



Individual factory inspection of every Square D melting alloy thermal overload relay means performance you can trust. Each unit is calibrated and thoroughly tested to make sure it will perform according to its rating.

***Write** for Bulletin SM-275 for the complete story on Square D starters with ONE-PIECE thermal overload relays. Address Square D Company, 4041 N. Richards St., Milwaukee 12, Wisconsin*

SQUARE D COMPANY

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ULTRAFLEX STATIC POWER

Adjustable Speed Packaged Drives

NO MOVING PARTS Static power conversions units have replaced the conventional M-g set. Ultraflex Packaged Drives save up to 50% in floor area . . . up to 75% in weight, permitting low cost installations or alterations without special handling equipment or floor loading preparations.

NO MOVING PARTS Ultraflex Packaged Drives work perfectly without forced ventilation . . . less power wasted as unwanted heat. No power robbing friction or windage losses. A closed-loop voltage regulation system, current limit control, and static field excitation insure peak operational efficiency.

NO MOVING PARTS Simple static power conversion units cut maintenance costs. With Ultraflex there are *no* bearings, commutators, or brushes to service. *No* shafts to align or couplings to maintain. *No* inertia loads to balance. *No* fans or filters to clean or change.

Standard Ultraflex Drives provide an 8:1 speed range with wider ranges available upon request. Optional features include dynamic braking, jogging, reversing, tachometer-generator speed regulation, etc. Get all the facts, and see how a Cutler-Hammer Ultraflex Packaged Drive can provide outstanding savings in installation, operation, and maintenance. Write today for new bulletins EN64-A200, and EN65-E274. Cutler-Hammer Inc., Milwaukee 1, Wisconsin.

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